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A REVIEW

OF

MINING OPERATIONS

IN THE

STATE OF SOUTH AUSTRALIA

DURING THE

HALF-YEAR ENDED JUNE 30th, 1911.

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ISSUED BY T. DUFFIELD, J.P., *Secretary for Mines*,

UNDER THE AUTHORITY OF THE

HONORABLE JOHN VERRAN, M.P.,

Minister of Mines.

DEPARTMENT OF GEOLOGICAL SCIENCES
UNIVERSITY OF TORONTO

Adelaide:

R. E. E. ROGERS, GOVERNMENT PRINTER, NORTH TERRACE.

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Miners' Rights and Privileges thereunder.

A miner's right is obtainable at the Department of Mines, Adelaide, also at the issuing stations in the various mining districts, at a cost of 5s.

A miner's right is in force for one year from the date of issue, and may be renewed at any time during its currency for another term of one year on payment of 5s.

The holder of a miner's right is authorised to prospect on any mineral lands for any metal, mineral, coal, or oil, and to peg out (of the prescribed shape and dimensions) gold, mineral, coal, and oil claims, and also leases of a like nature.

AREAS AND WORKING CONDITIONS.

GOLD LEASES—Maximum area, 20 acres; working conditions, one man to every five acres.

MINERAL LEASES—40 acres; one man to every 10 acres.

MISCELLANEOUS LEASES—

Salt	640 acres;	special conditions.
Gypsum	640 "	one man to every 40 acres.
Mining Works	10 "	one man.
COAL OR OIL LEASES	640 "	one man to every 40 acres.
GOLD DREDGING LEASES	200 "	special conditions.
MINERAL CLAIMS	40 "	
GOLD CLAIMS	30ft. x 30ft., alluvial; 100ft. x 600ft., reef.	

Gold claims must be constantly worked—one man for each claim—and mineral claimholders must employ two men for each claim. Amalgamation of either gold or mineral claims reduces the labor conditions by one-half.

Gold, mineral, coal, and oil leases are granted for a term of 42 years—the two former at a rental of 1s. per acre per annum and a royalty of 6d. in the pound on net profits, the latter at a rental of 6d. per acre per annum until coal or oil is found in payable quantities, when 1s. per acre is payable and a royalty of 6d. in the pound on the net profits.

The Minister may permit, for the concentration of labor, of the amalgamation of not more than four adjoining gold or mineral leases.

Any number of gold, mineral, coal, or oil leases may be held by one person.

Licences to search for twelve months for precious stones, mineral phosphates, oil, rare metals, minerals, and earths are issued on specific mineral lands, not exceeding five square miles in area for one person, a fee of 20s. being charged for each square mile or portion thereof. These licences give a preferential right to a lease over a portion of the area, as prescribed.

PREFACE.

The average prices for copper during the half-year are—"Standard," £55 2s. 3d.; "Best Selected," £58 13s. 5d.; and there is, therefore, little general activity in copper mining at present.

A good body of ore has been struck in the Wandilta Mine, details of which will be found within; and operations have commenced at the Paramatta and Yelta.

Gold mining operations in the North-East are extending, and some good returns have revived confidence in the Tarcoola district.

The deposits of rare uranium (radio-active) ores found near Mount Painter are being mined. Scientifically they are of great interest, and it is anticipated that they will prove of economic value as a source of radium.

The new bore sunk by the Government at Leigh Creek was not successful in finding a better class of coal, but experiments with the coal at present obtainable are contemplated.

T. DUFFIELD,

Secretary for Mines.

August 23rd, 1911.

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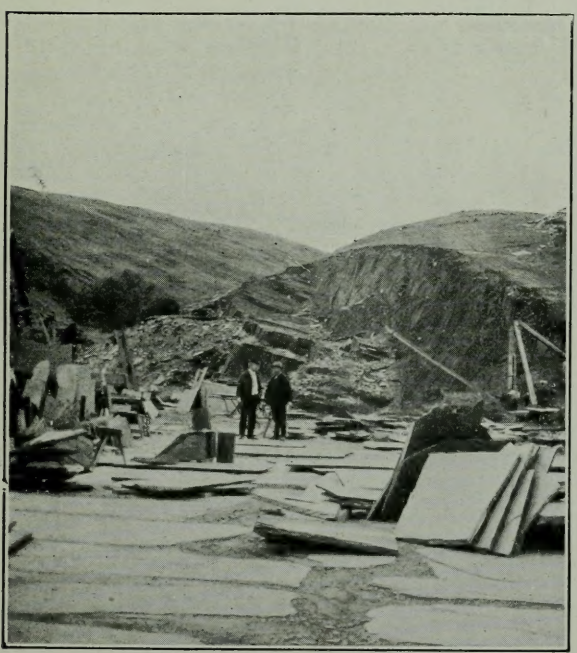
WILLUNGA SLATE QUARRIES.



(Photos. by Government Geologist.)

MARTIN'S QUARRY.

Mining Operations during the Half-year ended June 30th, 1911.

AREA AT PRESENT HELD UNDER MINING ACTS (JUNE 30TH, 1911)

Nature of Holding.	Number.	Area.
Mineral leases	278	14,654 acres
Gold leases	81	1,524 "
Gold dredging leases	1	34 "
Miscellaneous leases	41	7,584 "
Mineral claims	263	8,678 "
Occupation licences	210	105 "
Search licences	85	85,940 "
Coal claims	7	4,480 "
Gold claims	6	15 "
Total holdings	972	123,014 acres

REGISTERED FROM JANUARY 31ST, 1911, TO JUNE 30TH, 1911.

Mineral claims	61	1,970 acres
Gold leases	11	220 "
Mineral leases	10	370 "
Miners' rights	356	—
Search licences	29	30,080 "
Coal and oil claims	1	640 "
Gold claims	—	—
Total	468	33,280 acres

MEN EMPLOYED.

Estimated number of men employed in mining and mineral works, June 30th, 1911 :—

Copper	4,030
Gold	915
Salt	470
Silver-lead	30
Other minerals	550
Total	5,995

GENERAL NOTES.

The average price of standard copper per ton for the six months is £55 2s. 3d., and the range of prices—lowest, May 16th, £53 11s. 3d.; highest, June 27th, £57 10s. The average for the year 1910 is £57 3s. 3d., and for the 10 years 1901-10, £64 14s.

The following remark, made in the previous Review, may be repeated here :—
" With copper, our principal metal, at such a low figure throughout the half-year, it naturally follows that, except for the old and well established mines, mining operations in connection with the red metal have been considerably restricted, and prospecting for new finds has practically ceased until better markets prevail."

Hopeful feelings in regard to the future of the copper market are, however, not lacking, and there is a strong idea amongst mining men generally that the time of better prices will not be long in coming.

Operations have been started at the *Paramatta and Yelta* Mines, now owned by the State (*vide* page 6, Review No. 13). Mr. F. Richards, who was formerly connected with these mines, and is a native of Moonta, has been appointed manager, and took charge in May. The work in connection with putting the plant in order was at once taken in hand, and on June 26th the unwatering of the main Yelta shaft was commenced.

Good ore has been struck in the *Wandilta* Mine, and reports will be found on pages 17 and 39.

The *Wallaroo and Moonta* treated 73,652 tons of ore for 2,957 tons of copper, worth at average standard prices £162,978. The deepest shafts are, Moonta, 2,520ft.; Wallaroo, 2,499ft. The operations consist of mining work on various lodes, vein-stuff hauled to the surface, crushed, sorted, and concentrated by special machinery or treated chemically, the products forwarded to Wallaroo for smelting and refining into copper.

The Hamley.—The Government is assisting this mine by a subsidy. A large amount of developmental work has been carried out with satisfactory results, and a considerable area of ground has been opened up for stoping.

At the *Kapunda* Mine tributers raised a few tons of 22 per cent. ore, but work was discontinued in April, and nothing has been done since.

Blinman.—A party of men are at work beating out ore remaining in old stopes, etc., and have sent to market 50 tons, returning 9½ tons of copper.

At the *Belalie* Mine satisfactory progress is being made, *vide* Inspector Jones's report, page 27.

At *Mutooroo* some tribute work is in progress, and the precipitation of copper from the mine water continues.

The *Beltana Rapid Ore Treatment Syndicate* on the claims near Beltana has erected three head of stampers, boiler, engine, vats, tanks, landers, &c.

Appealinna.—Fifty-three tons of ore returned 16½ tons of copper. Prospecting operations in the lower levels not being successful so far, the pumps were lifted and the upper portion of the mine let to tributers.

At the *Union Consolidated* (Yudnamutana) the leases have been under exemption. Returns show 15 tons of ore treated for 3·40 tons of copper.

Mount Hecla and Mount Hecla West, near Mannahill.—Prospecting is in progress. The ore contains copper, silver, and gold. A parcel of between 8 tons and 9 tons has been sent away to be sampled.

The *Tarcoola Blocks* Company treated 415 tons of stone for 380ozs. of gold bullion valued at £1,040. The battery has been dismantled and re-erected at the main vertical shaft.

From the *Tarcoola Perseverance* 105 tons yielded 452ozs. 11dwts. 16grs., valued at £1,699 9s. 6d.

This is, perhaps, the most valuable parcel treated at Tarcoola so far, and is another strong pointer towards the hidden wealth of the district. The battery records show the amount previously treated from the Perseverance to be 93½ tons for 190ozs. 6dwts. 12grs., worth £709 15 4d., and the total from the claim, which adjoins the Tarcoola Blocks Company's property, is now 198½ tons for 642ozs. 18dwts. 4grs., worth £2,409 4s. 10d., or 243s. per ton.

Fifty tons from the *Curdnatta* yielded 64ozs. 9dwts., worth £245 13s. 4d.

Kitticoola.—On page 28 will be found an interesting report on the recent operations at this mine, well known in the old days as the Reedy Creek. Later returns from the tributers show that 10 head more of 1,000lb. stamps have been purchased, five of which are erected and the others in course of erection; also, the work of putting up a cyanide recovery plant is in hand. Three hundred and sixty four tons of stone have been treated by battery during the six months, yielding 172ozs. 17dwts. 1gr. of gold, worth £600, making the total from the tributers' plant so far 625 tons for 308 ozs. 1dwt. 11grs. of gold, valued at £1,052 6s. 8d., or 33s. 8d. per ton. The great possibilities of this mine, both in gold and copper, are recognised generally, and it is to be hoped that the present attempt to exploit some of the wealth contained will meet with the reward it deserves.

A little prospecting is being done at Watts's Gully, in the Gumeracha district.

From the *Virginia,* in the Wadnaminga district, 4 tons of stone gave 3ozs. 18dwts. 15grs., valued at £14 5s. 4d. A shaft has been sunk 50ft., and general prospecting is in progress.

Mount Grainger.—At the Petersburg Government plant 38 tons 16cwts. were treated for 58ozs. 13dwts. 22grs. of gold, valued at £232 6s. Vigorous work is in progress here, and the treatment plant on the ground is again being put in commission. A report from the Inspector is given on page 38.

A small treatment plant has been erected at *Teetulpa,* on the Lykke Viking, formerly known as the Scotchman and Ironclad. A report from Inspector Jones will be found on page 35.

No stone from the *Lux* has been treated during the last six months. The lessee reports that he has opened up on the eastern side of the shaft, and also stoped vein stuff from 40ft., about 7 tons of ore, not quite good enough to send away. He is hoping to get machinery erected to treat the ore on the ground, as cartage and rail carriage run away with the profit on the low-grade ore. There are shoots which would pay, but the reef taken altogether will only average 8dwts. to 10dwts. to the ton, and he is, naturally, disinclined to pick the eyes out of the reef, as he is of opinion that with machinery erected on the mine the whole reef would pay to treat.

Deloraine.—Operations consist of shaft-sinking, the erection of poppet legs, complete winding plant, and necessary buildings; 49 tons 5cwts. of ore have been treated, 17 tons 15cwts. at Mount Torrens, and 31 tons 12cwts. at the Electrolytic Co.'s works at Port Kembla. The total amount of gold obtained was 82ozs. 15dwts., viz., 1oz. 13dwts. 13grs. per ton, valued at £314 5s. 8d. Mr. J. K. Samuel, the secretary, supplies the following interesting notes:—"This company holds a 40 years' lease of 40 acres on freehold property belonging to the late Wm. Scott's

estate. The royalty payable is 2½ per cent. on the gross, and £1 per acre per annum surface rental. It also has an option without further payment over 312 acres adjoining its lease on the same terms. The crushings to date have been as under :—

No. of Parcel.	Net Dry Weight.	Raised from.	Treated at.	Value of Gold Recovered.	Value of Copper Recovered.	Cost of Treatment, &c.	Net Return.	Net Return per Ton.
	Tons.			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1	60·60	No. 1 Shaft	Mt. Torrens	334 10 6	—	34 9 4	300 1 2	4 19 0
2	78	No. 3 "	"	569 19 7	—	63 2 5	505 17 2	6 9 11
3	4·80	No. 3 "	Electrolytic Works, N.S.W.	91 11 7	38 14 1	15 18 0	114 7 8	23 16 7
4	93·25	No. 3 "	"	418 2 8	20 10 0	175 13 3	262 19 5	2 16 5
5	124·65	No. 1 "	Mt. Torrens	269 18 10	—	66 0 7	203 18 3	1 12 8
6	5	No. 6 "	"	8 12 1	—	3 4 11	5 7 2	1 1 5
7	31·29	No. 3 "	Electrolytic Works, N.S.W.	109 10 6	1 0 7	58 12 10	51 18 3	1 13 2
8	17·75	No. 1 "	Mt. Torrens	203 15 2	—	12 5 5	191 9 9	—
	415·34			£2,006 0 11	£60 4 8	£ 29 6 9	£1,636 18 10	£3 18 10

The principal work is being done on the N. of the lease, where a shaft (No. 3) is being sunk on the underlie 11ft. by 4ft. 6in., and has been in a lode carrying a 3ft. vein, worth from 1oz. to 2ozs. per ton all the way. At June 30th the shaft was down 80ft. This shaft is equipped with steam winch and pump. From No. 1 shaft, about 300yds. S., 203 tons have been crushed for a return of 208ozs. 14dwts. 17grs. There is no machinery at this shaft, which stopped at water level —about 30ft. Fifty yards S. of No. 1 shaft is No. 2, where good gold was struck just as water was reached, when work here was stopped. Shallow shafts, each about 10ft. deep, have proved the continuance of gold-bearing stone N. and S. of the workings referred to above, over a total length of half a mile."

Homeward Bound.—Shaft carried from 194ft. to 202ft., lode small at bottom. A parcel of 4 tons 1cwt. gave 5ozs. 19dwts. 9grs., or 115s. per ton. From a new shaft near the Klondyke boundary a parcel of 13 tons, obtained in sinking, has been sent in for treatment. The lode is small so far, from 6in. to 9in., and was forwarded without any picking. A good result is anticipated.

Later returns give the results of the treatment of this parcel, viz., 12 tons 15cwts. of stone ; gold recovered by battery, 14ozs. 0dwts. 2grs ; gold recovered by cyanide, 8ozs. 5dwts. 18grs. ; total, 22ozs. 5dwts. 20grs. The value of the gold was £89 4s. 6d., or 140s. per ton.

Salt.—The rains in January made the salt harvest a very difficult one ; however, later finer weather conditions prevailed, and it may be roughly estimated that a total of 60,000 tons was gathered.

Wheal Ellen (Commonwealth).—Seventy tons of gossan ore treated for 15ozs. of gold bullion, worth £45 ; 1,170 tons of pyrites have been sold for the manufacture of sulphuric acid ; 11 tons of ore sent to the smelters, containing gold 6dwts., silver 8ozs., and lead 26 per cent. The main shaft has been sunk 8ft. to form a sump, total depth 308ft. Also drove 50ft. S. off the crosscut at the 300ft. level, and opened up the pyrites at this level for stoping. Extended the N. drive at 240ft. level a further 50ft., making the total distance driven 200ft.

Flint Pebbles near Cape Banks.—About 128 tons of these pebbles have been marketed to two Broken Hill companies. They are found on the sea beach, and can only be worked at low tide. An order for 200 tons was received too late to permit the flints to be carted owing to the wet state of the roads.

Radium Extraction Co. of South Australia, Ltd.—The secretary furnishes the following information :— This company is carrying out prospecting and exploratory work on three search licences covering 8 square miles in the neighborhood of Mount Painter, about 75 miles from Leigh Creek, in the Yudnamutana district. It has located wide lodes containing radio-active ores, corundum, and monazite. Cuts at six different places have disclosed good radio-active ore at distances covering two miles. At No. 3 cut a shaft has been sunk 50ft. The best ore so far discovered has been at No. 6 workings, where a shaft was sunk and a rich seam of nearly clean *autunite* was opened up, samples from which went over 30 per cent. uranic oxide by electroscope test. Five tons have been taken out from this spot to send to Europe for report.

The corundum and monazite deposits have not yet been tested to any extent, but are known to be valuable.

On the *Radium Hill Company's* leases, about 20 miles E.S.E. of Olary Railway Station, or 12 miles southward from Cutana Railway Siding, vigorous development work has been done. About 600 tons of ore is at grass, and 43 tons of hand-dressed ore have been sent to the works at Bairnsdale for treatment.

Wolfram.—A new item of mineral production and export from this State is wolfram. The quantity is very small so far, Customs returns up to June 30th only showing 2¼cwts., valued at £13; but the fact has been demonstrated that wolfram exists at Callawonga, near Yankalilla, in appreciable amount, and it is to be hoped that large deposits will be discovered.

Mercury find near Willunga.—A report by the Chief Inspector of Mines on the operations at this place will be found at page 27.

Dr. H. Basedow, having accepted the post of Chief Protector and Chief Medical Officer of Aborigines in the Northern Territory, resigned his position as Assistant Government Geologist in April.

A discovery of *Brown Coal* or *Lignite* was made at Paradise, a few miles from the city of Adelaide, and the Government Geologist reported that he had visited Mr. Cheek's property at Paradise and inspected the brown coal or lignite obtained there by boring. The geological formation is Tertiary, and the same as that in which this material occurs at numerous other places in other parts of the State.

Lignite is not generally useful as fuel until manufactured into briquettes, and the matter resolves itself into the question as to whether a deposit of this kind can be mined and manufactured into briquettes at a price enabling it to compete with hard coal and wood. An analysis of an air-dried sample showed—

Moisture at 100° C.	14·65 %
Ash	21·12 %
Fixed carbon (non-caking)	25·93 %
Volatile hydro-carbons	38·30 %
	100·00 %
It contains sulphur	3·96 %

COPPER.

AVERAGE MONTHLY PRICE OF COPPER, JANUARY TO JUNE, 1911.

	Standard. £ s. d.	Best Selected £ s. d.
January	55 14 3	59 3 4
February	55 1 8	58 17 6
March	54 16 4	58 7 9
April	54 3 2	57 13 1
May	54 8 7	58 2 3
June	56 9 10	59 18 9
Average for the six months	55 2 3	58 13 5

RANGE OF PRICES—

June 27th	57 10 0
May 16th	53 11 3

AVERAGE PRICE OF STANDARD COPPER FOR THE LAST TEN YEARS.

	£ s. d.		£ s. d.
1901	66 19 1	1906	87 8 10
1902	52 8 3	1907	82 1 11
1903	58 3 2	1908	60 0 10
1904	59 0 7	1909	58 17 2
1905	64 16 10	1910	57 3 3

Average for the 10 years, £64 14s.

CRUSHING AND CYANIDING PLANTS.

RETURNS FROM GOVERNMENT CRUSHING AND CYANIDING PLANTS FOR THE HALF-YEAR ENDED JUNE 30TH, 1911.

Name of Mine.	Locality.	Ore Treated. Tons cwts. qrs.	Gold Recovered. Ozs. dwts. grs.	Value of Gold. £ s. d.	Yield per Ton, in Shillings.
PETERSBURG GOVERNMENT BATTERY AND CYANIDE WORKS.					
Copperlinka	Olary	17 10 0	11 6 16	42 14 1	49/-
Virginia	Wadnaminga	4 0 0	3 18 15	14 5 4	71/-
Mount Grainger	Mount Grainger	19 1 0	41 18 18	166 15 4	175/-
Government Mine	Tarcoola	1 4 0	2 15 6	10 7 6	173/-
Mount Grainger	Mount Grainger	14 0 0	13 15 10	53 10 8	76½/-
Mount Grainger	Mount Grainger	5 15 0	2 19 18	12 0 0	42/-
New Milo	Wadnaminga	12 0 0	11 5 15	40 15 11	68/-
Homeward Bound	Mannahill	4 1 0	5 19 9	23 6 7	115/-
Total		77 11 0	93 19 11	363 15 3	94/-
Grand total since starting of battery		4,282 2 1	4,063 19 14	15,139 3 3	71/-

RETURNS FROM GOVERNMENT CRUSHING AND CYANIDING PLANTS—*continued.*

Name of Mine.	Locality.	Ore Treated.	Gold Recovered.	Value of Gold.	Yield per Ton, in Shillings.
		Tons cwts. qrs.	Ozs. dwts. grs	£ s. d.	
MOUNT TORRENS GOVERNMENT BATTERY AND CYANIDE WORKS.					
H. A. Gee	Echunga	4 10 0	5 5 20	20 18 11	93/-
Deloraine	Kersbrook	5 0 0	2 8 10	8 12 1	34/-
Clara St. Dora	Callington	5 15 0	0 12 8	1 15 5	6/-
Stirling Reef	Echunga	5 10 0	0 12 7	2 1 6	7½/-
Pioneer	Callington	15 10 0	2 11 5	8 10 10	11/-
Kalgoorlie Golden Gate	Angaston	23 10 0	13 10 3	55 15 4	47/-
Deloraine	Kersbrook	17 15 0	55 8 6	203 15 2	229/-
Dienelt	Blumberg	5 0 0	1 7 22	5 4 8	21/-
Golden Thorpe	Woodside	9 7 0	3 13 15	14 10 6	31/-
Golden Thorpe	Woodside	16 10 0	3 8 19	13 12 11	16½/-
Castle Hill	Strathalbyn	5 15 0	0 17 22	3 1 4	11/-
Total		114 2 0	89 16 17	337 18 8	59/-
Grand total since starting of battery		9,749 16 1	5,737 8 5	21,625 10 1	44⅓/-

The Petersburg and Mount Torrens Government Batteries and Cyanide Plants are worked alternate months by the one staff. It will be observed that the parcels of ore treated have come from various localities, which show that prospecting has been fairly general throughout the State. A summary of the work done for the year ending June 30th, 1911, shows that 31 parcels have been treated, comprising 618 tons 3cwts. 0qrs. of ore, which yielded 659ozs. 2dwts. 20grs. of gold, valued at £2,471 15s. 6d. In addition to the foregoing, 457 tons of tailings have been treated by cyanide, and 311 assays and tests of small samples of ore not treated as parcels have been made. The ore treated by battery and the tailings by cyanide makes a total of 1,075 tons through the two processes.

TARCOOLA GOVERNMENT BATTERY AND CYANIDE WORKS.

No. of Parcel.	Name of Mine.	Ore Treated.	Gold Recovered.	Value of Gold.	Yield per Ton in Shillings.
		Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	
161	Perseverance	105 0 0	452 11 16	1,699 9 6	324/-
162	Curdnatta	25 0 0	54 12 18	199 1 0	159/-
163	Curdnatta	25 0 0	13 16 6	46 12 4	37/-
	Total	155 0 0	521 0 16	1,945 2 10	252/-
	Grand total since starting of battery	2,566 10 0	3,597 19 18	12,830 19 1	100/-

GLENLOTH GOVERNMENT BATTERY AND CYANIDE WORKS.

58	C. W. J. Bogh	25 0 0	13 4 14	43 16 9	35/-
59	New Glenloth B. & M. Co.	7 10 0	16 19 12	49 16 5	132/-
	Total	32 10 0	29 4 2	93 13 2	58/-
	Grand total since starting of battery	1,739 10 0	1,807 7 2	6,073 5 11	70/-

RETURNS FROM CRUSHING AND CYANIDING PLANTS (OTHER THAN GOVERNMENT) FOR THE HALF-YEAR ENDED JUNE 30TH, 1911.

Name.	Ore Treated.	Gold Recovered.	Value.	Yield per Ton, in Shillings.
	Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	
TARCOOLA BLOCKS COMPANY'S BATTERY AND CYANIDE PLANT.				
Battery treatment	415 0 0	380 0 0	1,040 0 0	—
Total	415 0 0	380 0 0	1,040 0 0	50
Grand Total since starting of Tarcoola Blocks Co.'s battery, May 16th, 1901, to June 30th, 1911..	29,508 0 0	42,273 0 0	128,540 0 0	87
KITTICOOLA, REEDY CREEK.				
Battery treatment	364 0 0	172 17 1	600 0 0	—
Total	364 0 0	172 17 1	600 0 0	33
COMMONWEALTH (WHEAL ELLEN), NEAR STRATHALBYN.				
Battery treatment	70 0 0	15 0 0	45 0 0	—
Total .....,	70 0 0	15 0 0	45 0 0	13

TOTAL BATTERY AND CYANIDE RETURNS FROM ALL PLANTS FOR SIX MONTHS ENDED JUNE 30TH, 1911.

Name.	Ore Treated.	Gold Recovered.	Va'ue.	Yield per Ton, in Shillings.
	Tons. cwts. qrs.	Ozs. dwts grs.	£ s. d.	
Petersburg	77 11 0	93 19 11	363 15 3	94/–
Mount Torrens	114 2 0	89 16 7	337 18 8	59/–
Tarcoola	155 0 0	521 0 16	1,945 2 10	252/–
Glenloth	32 10 0	29 4 2	93 13 2	58/–
Tarcoola Blocks	415 0 0	380 0 0	1,040 0 0	50/–
Kitticoola	364 0 0	172 17 1	600 0 0	33/–
Wheal Ellen	70 0 0	15 0 0	45 0 0	13/–
Total	1,228 3 0	1,301 17 13	4,424 9 11	72/–

NORTHERN TERRITORY.

ARLTUNGA AND WINNECKE'S DEPOT PLANTS, MACDONNELL RANGES.

The MacDonnell Ranges, although within the boundaries of the Northern Territory and coming under the operation of the Northern Territory Mining Act, yet geographically belong to South Australia proper; and prior to January 1st, 1911, when control of the Northern Territory was taken over by the Federal Government, all business was done from Adelaide.

The returns for the six months ended December 31st, 1910, which complete the records in connection with these plants so far as the administration of this State is concerned, were received too late for insertion in the last Review, and are now published :—

ARLTUNGA AND WINNECKE'S DEPOT GOVERNMENT CYANIDE PLANTS.

Name.	Ore Treated.	Total Gold Recovered.	Value.	Yield per Ton, in Shillings.
	Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	
ARLTUNGA.				
White Range, Luce's	30 6 0	77 2 17	290 5 6	191/-
" Excelsior	4 0 0	5 16 12	20 7 10	102/-
" Extended	12 0 0	18 14 12	65 6 2	109/-
" Luce's	8 17 0	12 17 19	48 12 5	110/-
" "	16 3 0	22 14 21	84 7 11	105/-
" "	31 5 0	56 13 13	217 2 6	139/-
" "	9 10 0	13 14 21	51 18 5	109/-
" "	12 10 0	18 14 17	72 11 2	116/-
" "	18 10 0	18 4 3	69 18 4	75½/-
" "	4 10 0	5 12 12	20 18 9	93/-
" Excelsior	5 0 0	5 12 16	21 5 0	85/-
" "	5 12 0	5 17 14	20 17 10	76/-
" Extended	19 6 0	28 2 6	99 2 11	108/-
" Luce's	4 3 0	5 3 6	19 12 10	95/-
" Extended	9 0 0	10 10 20	39 7 6	87½/-
" Luce's	6 17 0	6 12 0	25 2 0	100/-
Wheal Fortune	7 1 0	19 5 10	74 3 6	212/-
White Range, Luce's	4 5 0	1 19 7	7 3 8	32/-
" Associated	9 0 0	9 1 13	34 14 8	77/-
" Luce's	16 10 0	18 6 18	70 16 0	86/-
" Excelsior	8 3 0	13 16 18	52 19 2	130/-
" Luce's	29 11 0	48 6 12	182 6 10	124/-
" Associated	3 17 0	7 1 20	26 16 8	113/-
" Luce's	4 6 0	2 14 9	9 17 3	46/-
" Extended	11 14 0	32 16 9	119 10 4	201/-
" "	7 4 0	11 11 20	42 18 0	120/-
" Luce's	5 18 0	8 7 7	31 17 6	108/-
Total	304 18 0	485 12 16	1,819 19 10	120/-
Grand total since starting of battery to December 31st, 1910..	10,995 19 0	13,873 1 7	51,405 2 2	94½/-
WINNECKE'S DEPOT.				
Big Gun	9 0 0	16 3 12	60 17 1	146/-
Grand total since starting of battery to December 31st, 1910..	354 7 0	194 1 11	728 6 7	41/-

REPORTS ON BORING OPERATIONS.

BORING OPERATIONS AT LEIGH CREEK.

Report by Mr. A. W. Matthews, Foreman.

BORE No. 3.

(*Vide* Record, page 344, and Review No. 13, page 13.)

Surface to 4ft.	Surface loam.
4ft. to 12ft.	Alluvial
12ft. to 16ft.	Hard conglomerate.
16ft. to 30ft.	Gypseous clay.
30ft. to 132ft.	Shale, with occasional bands of calcareous shale.
132ft. to 143ft.	Shale showing pyrites.
143ft. to 608ft.	Shale, with bands of calcareous shale from 1in. to 1ft. thick; also shale showing pyrites.
608ft. to 646ft. 9in.	Coal matter.
646ft. 9in. to 647ft. 6in.	Shale.
647ft. 6in. to 653ft. 1in.	Coal matter.
653ft. 1in. to 661ft. 1in.	Shale and coaly matter.
661ft. 1in. to 662ft. 1in.	Shale.
662ft. 1in. to 664ft. 1in.	Coal matter.
664ft. 1in. to 671ft. 4in.	Sandy shale.
671ft. 4in. to 675ft. 10in.	Coal matter.
675ft. 10in. to 720ft. 8in.	Shale, with small seams of calcareous shale.
720ft. 8in. to 721ft. 2in.	Coal matter.
721ft. 2in. to 872ft.	Shale with bands of calcareous shale.
872ft. to 879ft.	Coal matter.
879ft. to 887ft.	Shale.
887ft. to 896ft.	Coaly matter.
896ft. to 906ft.	Grey shale.
906ft. to 919ft. 5in.	Shale and calcareous shale.
919ft. 5in. to 936ft. 10in.	Light-colored shale.
936ft. 10in. to 975ft.	Shale with small seams of coal matter.
975ft. to 976ft.	Coal matter.
976ft. to 979ft.	Shale.
979ft. to 980ft.	Coal matter.
980ft. to 988ft.	Sandy shale.
988ft. to 997ft. 9in.	Sandy shale and sandstone.
997ft. 9in. to 1,027ft. 7in.	Pyritic shale.
1,027ft. 7in. to 1,042ft. 10in.	Variegated sandstone.
1,042ft. 10in. to 1,058ft. 2in.	Light sandstone.
1,058ft. 2in. to 1,079ft.	Sandstone.

At 1,079ft. bed rock was entered, in which drilling was continued to 1,126ft. 4in. and then stopped.

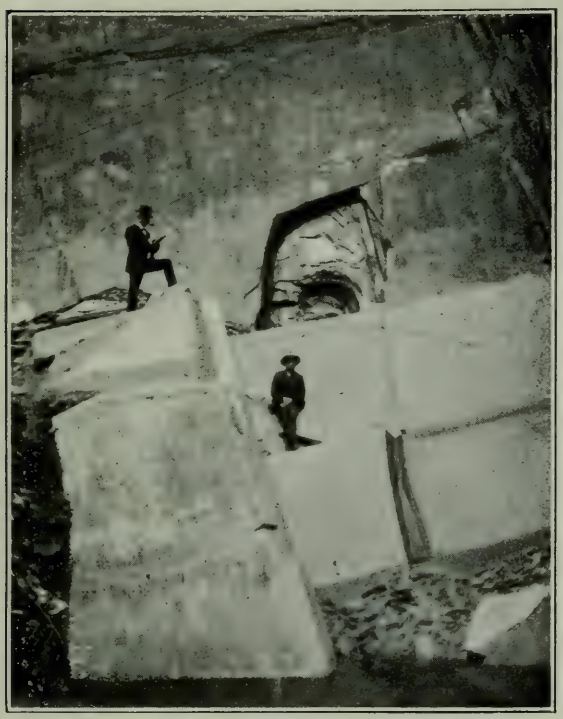
SAMPLES OF CORE TAKEN FROM BORE No. 3 AT LEIGH CREEK YIELDED, ON ANALYSIS AT THE SCHOOL OF MINES, AS UNDER:—

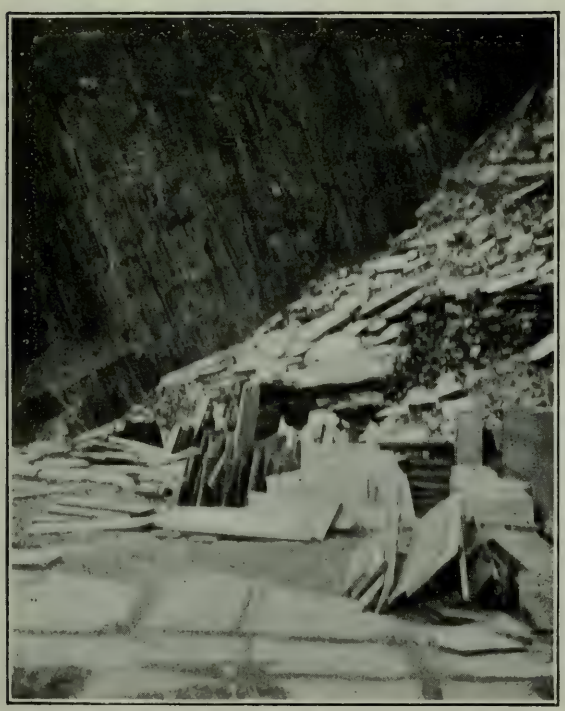
Depth.	Water at 100°C.	Ash.	Volatile Matter.	Fixed Carbon.	
	%	%	%	%	
608ft. 6in. to 609ft.	13·19	7·47	38·58	40·76	
609ft. to 612ft.	12·00	18·12	29·85	40·03	
612ft. to 614ft.	13·40	14·64	34·55	37·41	
614ft. to 616ft.	14·76	4·49	33·30	47·45	
616ft. to 619ft.	12·40	18·02	33·16	36·42	
619ft. to 623ft.	11·78	26·34	28·94	32·94	
623ft. to 625ft.	13·54	23·16	31·86	31·44	
625ft. to 627ft. 6in.	13·90	18·92	37·78	39·40	
627ft. 6in. to 629ft. 6in.	13·85	19·78	30·89	35·48	
629ft. 6in. to 631ft.	15·79	20·10	34·42	29·69	
631ft. to 633ft. 6in.	14·92	14·61	40·52	29·95	
633ft. 6in. to 635ft. 6in.	12·80	24·10	29·70	33·40	
635ft. 6in. to 637ft. 6in.	14·74	20·87	30·60	33·79	
637ft. 6in. to 639ft.	13·12	28·42	32·28	26·18	
639ft. to 642ft. 6in.	13·69	21·20	29·10	36·01	
642ft. 6in. to 645ft. 6in.	14·50	15·09	32·52	37·89	
645ft. 6in. to 646ft. 9in.	17·48	8·43	32·87	41·22	
646ft. 9in. to 647ft. 6in.	4·00	71·08	—	—	Shale
647ft. 6in. to 649ft. 2in.	15·94	20·04	31·19	32·83	
649ft. 2in. to 653ft.	9·76	49·94	21·96	18·34	
653ft. to 661ft. 1in.	2·82	83·84	—	—	Shale
661ft. 1in. to 662ft. 1in.	6·03	63·10	—	—	Shale
662ft. 1in. to 664ft. 1in.	16·93	18·59	32·49	31·99	
671ft. 4in. shale	5·66	65·32	—	—	Shale
671ft. 4in. to 672ft. 6in.	14·04	38·08	34·08	13·04	
672ft. 6in. to 673ft. 10in.	15·58	25·84	24·04	34·54	
673ft. 10in. to 657ft. 10in.	11·70	46·49	23·98	17·83	
674ft. 10in. (2in. special sample)	20·40	18·26	32·62	28·72	
720ft. 8in. to 721ft. 2in.	2·74	68·50	18·02	10·74	Coal shale
873ft. 6in. to 875ft. 6in.	4·66	68·52	15·68	11·14	Coal shale
875ft. 6in. to 876ft.	4·40	68·08	16·44	11·08	Coal streaks and charcoal
876ft. to 878ft.	5·02	61·90	19·06	14·02	Coal shale with streaks of coal
887ft. to 889ft.	12·04	24·36	25·86	37·74	Coal shale
891ft. to 893ft.	9·52	44·48	25·30	20·70	
893ft. to 894ft. 5in.	10·10	40·34	27·83	21·73	
894ft. 8in.	8·12	32·42	33·98	25·84	
895ft. 5in. to 896ft. 5in.	12·10	18·16	37·14	32·60	

All the fixed carbons were non-caking.

Reporting on the latter portion of these samples the Government Geologist says:—"I have received samples of cores from the foreman of the Diamond Drill Boring at Leigh Creek. These are from strata pierced between 720ft. 8in. and 721ft. 2in., between 872ft. and 878ft., and between 887ft. 5in. and 896ft. 5in. respectively. All the samples consist of carbonaceous and bituminous shale (coal shale) with the exception of one, which, on analysis, was found to contain only 18 per cent. of ash, and may, perhaps, be classed as coal. Average samples taken from these cores have been analysed, and the results are given in the foregoing table."

WILLUNGA SLATE QUARRIES.





(Photos. by Government Geologist.)

BANGOR QUARRY.

Faces page 16.]

BORING OPERATIONS AT RAPID BAY.

Report by Mr. C. F. Duffield, Foreman.

Locality of Bore.—Rapid Bay Copper Mine, formerly known as the Gattagolinga, about 3 miles S.W. of Second Valley, and about 9 miles N.E. of Cape Jervis.

No. 1 Bore.—Situated at the top of the cliff, about 220ft. above sea level, and 400ft. back from the lode outcropping at the bottom of the cliff at sea level. Angle of bore 10°, to cut the lode at from 500ft. to 600ft. Boring started February 14th.

Surface to 18ft. 2in.	Surface loam, limestone rubble, sandy wash, and boulders.
to 217ft.	White and blue marble.
to 220ft.	Slate.
to 520ft.	Practically no decided change in the country, it being calcite interstratified with bands of slate, and from 350ft. the core showed pyrites in varying quantity. The country throughout was of very broken nature, which made it necessary to ream the hole out to 350ft., and put in casing to that depth, so that the water would return, and also to protect the sides of the bore hole which were continually falling across the hole and giving considerable trouble. Total depth of bore, June 30th, 520ft.

WANDILTA MINE.

Report by Mr. A. W. Matthews.

During the half-year the work has been confined to cutting plats, removing the plunger from 60ft. to 180ft. level, shaft-sinking, and cleaning out and timbering old main shaft.

At 191ft. sinking was discontinued for the time, and two plats were cut at the 180ft. level, size 10ft. by 12ft. by 16ft. within timbers. On completion of the plats a chamber was cut for taking cistern and cistern and pump bearers. The new 12in. plunger was then installed and the old plunger removed from the 60ft. level, thus making a direct lift from the 180ft. level to surface. The plunger taken out will be used at the next lift. Sinking was then resumed, and the shaft sunk a further distance of 51ft., making total depth 242ft. Most of the sinking was in lode formation, showing leaders of calcite, felspar, and quartz, ranging from a few inches to 1ft. thick, and all carrying good sulphide. At 235ft. we cut a lode composed of calcite, felspar, and quartz, which showed very rich purple, black, and yellow ore. Sinking in this lode has been continued for a depth of 12ft. without disclosing any footwall. The lode is at present showing for the full length and width of shaft, and carries good ore right through. Until the lode has been driven on I cannot give the exact course, but taking the length exposed in the shaft, it is practically a N.E. S.W. lode, dipping sharply to the S.W., and with a W. underlie. The shaft has been close timbered and centred into three compartments to 230ft., also ladders and stages fixed. The water has been exceptionally heavy, making as much as 18,000galls. per hour. To help cope with this, a supplementary pump, size 10 by 7½ by 4, was fixed at the 180ft. level, and a 6¾in. Marsh sinking pump put in to supply same from the bottom. I am pleased to report that the water is now easing off, and the 12in. plunger has no difficulty in keeping same.

The old main shaft has been cleaned out to 84ft. Size of same 10ft. by 5ft. within timbers. We are at present timbering same, and have it close timbered for a distance of 40ft. This shaft will be used as an air shaft when development work is started at the lower levels, and will also enable us to test the old line of lode. All the machinery is in good order and working well. The development in the shaft at 235ft. is very satisfactory, and gives every indication of proving a permanent and payable ore body.

Enclosed are the assay results of eight samples taken by the Chief Inspector of Mines.

No. of Sample.	Description.	Gold per ton. Oz.	Gold per ton. dwts.	Silver per ton. Oz.	Silver per ton. dwts.	Copper. %
1.	Bornite and copper pyrites	0	1	0	19	21·0
2.	Bornite and copper pyrites	0	1	0	7	16·1
3.	Bornite, copper pyrites, and felspar	0	5	0	11	16·6
4.	Felspar, bornite, and copper pyrites	Trace		0	9	5·4
5.	Felspar, bornite, and copper pyrites	0	1	Trace		11·1
6.	Copper pyrites and bornite	0	1	0	12	32·6
8.	Copper pyrites, bornite, and felspar	0	1	0	7	22·2
9.	Copper pyrites, bornite, and felspar	0	1	0	9	18·3

SUBSIDIES.

The Legislature provided in the Mining Act, 1893, and in previous measures for the encouragement of Mining.

The following schedule shows what subsidies have been paid from the inception of the system to June 30th, 1911, and the sums repaid. In the ordinary way these repayments are made from profits—50 per cent. of such profits being devoted to repayments. In two instances only have the profits won enabled full repayments to be accomplished—the Crystal Mine, at Echunga, which repaid £76 7s. 6d. from that source, and the once-famons New Alma and Victoria Mine, Waukaringa, which repaid in full the first subsidy, £3,000. The remainder of the recoveries was derived from sales of mining plant held as security. The total subsidies advanced is £53,822 8s. 4d., of which £6,111 13s. 9d. has been recovered, leaving a debit balance of £47,710 14s. 7d. Portion of this outstanding debt is represented by machinery that has fallen into the hands of the Government; add to this the value of the metals won, and the State in general will probably have benefited beyond the money value of the debit balance.

STATEMENT OF SUBSIDIES PAID FROM COMMENCEMENT TO JUNE 30TH, 1911.

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.			Amount Repaid.		
		£	s.	d.	£	s.	d.
Adelaide Crushing, Grinding, and Amalgamating Mill Co.	—	100	0	0	—		
Algebuckina Gold Mining Syndicate	Algebuckina	52	10	11	52	10	11
Alma Extended Gold Mining Co.	Waukaringa	3,000	0	0	22	5	0
Backhouse, T. S.	Worturpa	100	0	0	—		
Barossa Enterprise Gold Mining Coy.	Barossa, Hundred of	232	2	6	—		
Belalie Copper Mining Syndicate	Bundaleer	392	12	3	—		
Bevilaqua & Angel	Palmer (near)	57	18	0	—		
Bird-in-Hand Gold Mining Co., Ltd.	Woodside	3,000	0	0	—		
Blackfellow's Creek Gold Mining Co., Ltd.	Kuitpo, Hundred of	660	6	7	35	0	0
Callington Copper Mining Co.	Callington	148	8	7	—		
Cockburn Copper Mining Co., N.L.	Mutooroo	273	18	5	—		
Commonwealth Silver-lead Co., Ltd.	Strathalbyn, Hund. of	750	0	0	—		
Copper Hill Mining Co., N.L.	Kadina	391	15	0	—		
Countess of Jersey Gold Mining Co., N.L.	Wadnaminga	321	0	0	—		
Currency Creek Copper Mining Co.	Currency Creek	28	6	5	20	0	3
Crystal Gold Mining Co.	Echunga	563	17	6	176	7	6
Ding Dong Copper Mining Syndicate	Kanmantoo, Hund. of	124	0	4	—		
Duke of Cornwall Gold Mining Syndicate	Mount Pleasant	458	17	4	43	10	0
Eagle Silver Mining Co., Ltd.	Glen Osmond	500	0	0	—		
Echunga Proprietary Hydraulic Gold Sluicing Co., N.L.	Echunga	500	0	0	20	0	0
Ediacara Consols Silver Mining Co., N.L.	Ediacara	651	12	1	375	17	0
Enterprise Copper Mining Co., N.L.	Barossa, Hundred of	150	0	0	9	16	0
Enterprise Excelsior (Barossa Amalgamated)	"	2,000	0	0	—		
Eureka Gold Mining Co., Ltd.	Woodside	1,500	0	0	—		
Fifth Creek Central Silver and Copper Mining Co., N.L.	Fifth Creek	253	2	4	—		
Fortress Hill Mining Syndicate	Fortress Hill	60	0	0	—		
Glenloth Mining, Battery, & Options Co., N.L.	Glenloth	515	4	7	515	4	7
Glenloth Wells Pioneer Blocks Co., Ltd.	"	100	0	0	22	18	5
Gumeracha Gold Mining Syndicate	Gumeracha	75	0	0	—		
Golden Point Claims	Wonna	50	0	0	—		
Great Ironclad Gold Mining Co.	Teetulpa	218	6	9	—		
Hakendorf, C. H., and Williams, J. (Glenmarkie Mine)	Glenloth	221	17	6	—		
Hamley Copper Mining Co.	Wallaroo	1,500	0	0	—		
Heithersay, J., Mt. Grainger Medora Mines	Mount Grainger	77	7	7	—		
Homeward Bound and Klondyke Gold Mines, N.L.	Mannahill	192	17	1	—		

STATEMENT OF SUBSIDIES PAID—*continued.*

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced. £	s.	d.	Amount Repaid. £	s.	d.
Hunter Bros. (Lady Millicent Mine)	Mochatoona	100	0	4	—		
Ireby Gold Mining Syndicate	Mount Grainger	35	4	3	—		
Kirkeek's Treasure Gold Mining Co.	Waukaringa	691	8	1	—		
King's Bluff G.M. Co., N.L.	Olary	214	11	9	—		
Kohinoor Gold Mining Co., N.L.	Kangaroo Island	137	17	0	—		
Kohinoor Mine (H. G. Taylor)	"	162	3	0	—		
Lady Alice Gold Mining Co.	Barossa, Hundred of	1,797	2	3	—		
Lady Franklin Syndicate	Port Lincoln	200	0	0	40	0	0
Leigh's Creek South Coal Mining Co., N.L.	Leigh's Creek	95	16	4	95	16	4
McMurtie's Claims	Kuitpo, Hundred of	199	19	11	—		
Medora and Grainger Gold Mines Syn., N.L.	Mount Grainger	344	2	2	—		
Mingary Gold Mining Co.	New Luxemburg	650	0	0	—		
Mount Victoria Mine	Bimbowrie	50	0	0	—		
Mount Malvern Silver Mining Co.	Blackwood	491	3	6	—		
Mount Malvern Silver-lead Mining Co., N.L.	Clarendon	1,347	15	3	—		
Mount Pangæus Gold Mining Co.	Hahndorf (near)	56	1	4	—		
Mount Monster Gold Mining Syndicate	Kuitpo, Hundred of	350	0	0	1	0	0
Mt. Grainger Ironclad Gold Mining Syn., Ltd.	Mount Grainger	21	18	10	—		
Mount Torrens Gold Mining Co.	Mount Torrens	1,000	0	0	—		
Musgrave Ranges Prospecting Association	Musgrave Ranges	47	2	0	—		
Mount Painter Corundum and Gem Syndicate	Mount Painter	47	3	1	—		
Morning Star Gold Mining Co.	Teetulpa	68	4	6	—		
Mutooroo Copper and Silver Mining Co., Ltd.	Mutooroo	500	0	0	500	0	0
Nackara Proprietary Copper Mining Co, N.L.	Nackara	100	0	0	—		
Nackara Proprietary Gold Mining Syndicate.	Nackara	100	0	0	—		
New Banksia Gold Mining Syndicate	Nairne	250	0	0	—		
New Alma and Victoria Gold Mining Co., Ld.	Waukaringa	3,000	0	0	3,000	0	0
New Ajax Consolidated Gold Mining Co., N.L.	"	750	0	0	—		
New Era Gold Mining Co, Ltd.	Woodside	1,000	0	0	—		
New Glenloth Battery and Mining Co., L.N.	Glenloth	681	5	0	—		
New Mount Grainger Gold Mines, N.L.	Mount Grainger	393	7	1	220	0	0
Northern Mining and Smelting Co., N.L.	Mount Fitton	350	0	0	—		
North Nairne Gold Mining Co.	Nairne	500	0	0	—		
North-West and West Australian Pros. Co.	North-west of S.A.	104	9	7	—		
North-West Prospecting Association, N.L.	Tarcoola	150	0	0	—		
Nil Desperandum Teetulpa Devt. Co., N.L.	Teetulpa	64	14	4	20	5	6
Nilpena Copper Mining Co., Ltd.	Blinman	290	5	3	—		
Onkaparinga Dredging and Mining Co.	Biggs' Flat	550	0	0	—		
Paull's Consolidated Copper Propy., N.L.	Burr Well	525	0	0	—		
Parara Mining Co., N.L.	Maitland	571	3	6	—		
Paringa Mining Syndicate	Callington	399	16	8	244	0	0
Paringa and West Kanmantoo Consolidated Copper Mine, N.L.	"	1,144	3	4	—		
Pioneer Gold and Copper Mining Syndicate	"	95	15	6	—		
Polmear, W. J. L.	Kadina	800	0	0	—		
Queen Bee Mining Co., N.L.	New Luxemberg	250	0	0	250	0	
Quorn Manganese and Silver Mining Co.	Quorn	10	9	10	—		
Rapid Bay Silver Mining Co., N.L.	Yankalilla, Hund. of	136	2	4	—		
Royal Charlie Gold Mining Co.	Mannahill	153	18	5	—		
Rees, R., Ajax Mine	Waukaringa	604	14	5	—		
Stainbank, A. T.	Fifth Creek	70	14	11	—		
Sliding Rock Copper Proprietary, N.L.	Sliding Rock	2,000	0	0	5	12	0
Tarcoola Blocks Gold Mining Co., Ltd.	Tarcoola	3,995	5	2	—		
Tarcoola Enterprise Gold Mining Co., N.L.	"	100	0	0	19	10	4
Tarcoola Proprietary Gold Mines, N.L.	"	150	4	4	9	15	
Teatree Gully Gold Mining and Pros. Assn.	Teatree Gully	234	5	7	—		
Teetulpa Mining and Crushing Co.	Teetulpa	349	11	4	—		
Teetulpa Prospecting Syndicate	"	49	15	6	—		
Tumby Bay Copper Mining Co., N.L.	Hutchison, Hund. of	186	17	2	—		
Victoria Hill Amalgamated Gold Mining Syn.	Barossa, Hundred of	38	12	6	—		
Victoria Tower Mining Co., N.L.	Mannahill	345	18	9	90	0	0
Warrakimbo Propy. Copper Mining Synd.	Barndioota, Hundred of	220	16	2	—		
Warra Warra Propy. Copper Mines, N.L.	Farina	322	4	11	322	4	11
Watt's Gully Gold Mining Co.	Gumeracha	50	0	0	—		

STATEMENT OF SUBSIDIES PAID—*continued.*

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.			Amount Repaid.		
		£	s.	d.	£	s.	d.
Watt's Gully Reef Claims	Gumeracha	50	0	0	—		
Wolters, F. C., & Co	Echunga	25	0	0	—		
Wallaroo Central Mining Co., N.L.	Kadina	500	0	0	—		
Westward Ho Mine (Dr. H. Dixon)	Mannahill	1,000	0	0	—		
Wohler, H., & Co.	Myponga	20	0	0	—		
Wheal Turner Copper Mining Co., Ltd.	Prospecting on proposed line to Queensl'd Border	1,000	0	0	—		
Winnininnie Gold & Silver Propy. Co., N.L.	Winnininnie	86	3	6	—		
Woodside Boring and Mining Syndicate	Woodside	422	17	11	—		
Worturpa Exploration and Mining Co., Ltd.	Worturpa	800	0	0	—		
Yelta New Copper Mining Co, N.L.	Wallaroo	1,000	0	0	—		
Totals	—	53,822	8	4	6,111	13	9

ASSAYS AT SCHOOL OF MINES.

NUMBER OF ASSAYS MADE FOR PUBLIC PURPOSES AT THE SCHOOL OF MINES ASSAY DEPARTMENT DURING THE SIX MONTHS ENDED JUNE 30TH, 1911.

	1911.					
	January.	February.	March.	April.	May.	June.
Assays for Warden of Goldfields	99	47	108	17	84	24
Assays for Government Geologist	12	5	4	21	9	1
Free public assays	44	103	50	66	137	70
Totals	155	155	162	104	230	95

ACCIDENTS IN MINES AND QUARRIES.

A gratifying feature of our mining operations in mines and quarries is the infrequency of serious accidents. Act No. 858 of 1904, bringing quarries in the same category as mines as regards the controlling hand of the Chief Inspector of Mines, has been effective in safeguarding the interests of miners. The following table gives the number of accidents in mines and quarries since passing of the Act:—

ACCIDENTS IN MINES AND QUARRIES.

Accidents in Mines.				Accidents in Quarries.			
Year.	Total Number of Accidents Reported.	Number of Persons Injured.	Number of Persons Killed.	Year.	Total Number of Accidents Reported.	Number of Persons Injured.	Number of Persons Killed.
1904	5	1	4	1904	1	1	1
1905	3	1	3	1905	—	—	—
1906	5	—	3	1906	1	1	—
1907	8	4	6	1907	3	1	2
1908	5	4	1	1908	—	—	—
1909	6	5	1	1909	1	1	—
1910	5	3	3	1910	2	1	1
Jan.-June, 1911	1	—	1	Jan.-June, 1911	—	—	—

DECENNIAL RETURN SHOWING OUTPUT AND VALUE OF VARIOUS METALS AND MINERALS PRODUCED IN SOUTH AUSTRALIA SO FAR AS CAN BE ASCERTAINED.

Year	Gold.		Silver.		Silver Lead Ore.		Copper.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ounces.	£	Ounces.	£	Tons.	£	Cwts.	£
1901	4,918	16,613	—	—	1,410	11,357	134,719	468,606
1902	7,231	24,878	—	—	2,680	19,740	136,937	388,162
1903	8,650	28,650	7,086	804	211	1,267	129,812	417,116
1904	17,897	76,025	—	—	—	—	125,560	382,356
1905	10,983	45,853	—	—	—	—	130,959	426,511
1906	8,037	27,000	801	104	—	—	164,160	718,609
1907	5,609	20,540	5,845	780	1,000	11,000	158,620	690,000
1908	2,908	12,300	—	—	900	9,000	112,554	338,000
1909	7,111	30,206	1,660	167	70	416	113,940	334,584
1910	6,603	28,000	6,250	625	25	22	102,040	306,120
Totals....	—	310,065	—	2,480	—	52,802	—	4,470,064

Year.	Copper Ore and Regulus.		Lead.		Ironstone Flux.		Limestone Flux.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Cwts.	£	Tons.	£	Tons.	£
1901	1,866	23,011	1,360	722	—	—	—	—
1902	2,579	42,550	43,507	22,303	—	—	—	—
1903	7,069	54,922	14,408	8,799	84,932	46,712	—	—
1904	3,051	24,597	—	—	46,687	27,091	43,440	6,516
1905	2,563	28,434	1,040	369	84,483	48,577	44,498	4,791
1906	—	—	1,000	550	75,226	33,852	31,940	4,791
1907	—	—	—	—	84,600	38,100	31,100	5,800
1908	—	—	—	—	88,000	39,600	29,500	6,000
1909	1,230	4,003	140	90	16,120	8,296	13,765	2,464
1910	—	*9,350	400	260	40,200	21,945	18,600	3,720
Totals	—	186,867	—	33,093	—	264,173	—	34,082

Year.	Phosphate Rock.		Crude Salt.		Other Metals and Minerals.	Total Value.
	Quantity.	Value.	Quantity.	Value.	Value.	
	Tons.	£	Tons.	£	£	£
1901.....	—	—	—	—	2,219	522,478
1902.....	—	—	—	—	742	498,375
1903.....	1,000	1,000	40,000	12,000	100	571,371
1904.....	3,000	3,000	40,000	12,000	198	531,783
1905.....	5,000	5,000	32,500	13,000	1,261	573,796
1906.....	5,850	5,850	55,000	27,500	2,209	820,465
1907.....	8,000	8,000	75,000	37,500	2,500	814,220
1908.....	11,000	11,000	75,000	37,500	4,500	457,900
1909.....	3,772	3,697	51,407	25,594	3,873	413,390
1910.....	5,200	5,200	54,000	27,000	†13,600	415,842
Totals	—	42,747	—	192,094	31,202	5,619,669

* Bluestone, £5,980 Sulphuric Acid, £3,370. † Including Gypsum, £9,000; Pyrites, £3,270.

REPORTS

BY

The Government Geologist (H. Y. L. Brown, F.G.S.)

ON DRAINAGE OF PORTION OF THE SOUTH-EASTERN DISTRICT BY MEANS OF BORES AND SHAFTS.

[For previous reports, *vide* Review No. 13.]

REPORT No. 4.

I have again visited Dismal Swamp Station and inspected the swamps, most of which are now dry. I remained there while a bore was being put down to test the question of underground drainage in the case of a swamp of 8 or 10 acres which was still flooded. The bore was sunk by two men to a depth of 80ft. in five days, and the water, when turned on, flowed away freely into the bore hole without raising the water level, which was 17in. below the surface of the water in the swamp. Owing to want of necessary appliances the bore could not be sunk deeper so as to penetrate the lower drainage beds, which, it may confidently be anticipated, will reduce the present water level in it very considerably. From the rapidity with which the swamp water was absorbed underground in this case I am of opinion that shafts may not be required, but that bores, if properly placed so as to take the rainfall gradually before the water accumulates, will be sufficient. This experiment and those made with certain " run-away " holes, of which I have previously informed you, prove my contention that the surface water in the Dismal Swamp district, where rainwater accumulates and remains on the land for a considerable portion of the year, can be drained by this means, if not completely, at least sufficiently to render large areas available for agricultural and pastoral purposes. (25–4–11.)

REPORT No. 5.—DISMAL SWAMP AREA.

Bore on Section No. 3500, Hundred of Young.—Drainage beds were proved to exist at 80ft., whereby water from the swamp was carried away (as previously reported) until the heavy rains of the winter season saturated the porous limestone formation, which in many places outcrops at the surface. The water level was therefore raised, and became too high to allow a further influx into the bore. Boring was continued to 150ft., principally through coralline limestone and bands of clay and sand, the main sand drift being apparently at the bottom. An attempt was made to tube back the water from the saturated strata, and that the water was not appreciably carried away was, I am of opinion, due to the fact that the bore (4in. in diameter) was too small to cope with the water during the winter season. Owing to the heavy and continuous rains I deemed it advisable to discontinue work for the present.

Bore on Section 211.—This bore was sunk some time ago, and, according to a section of the strata furnished me by the Public Works Department, passed through the coralline limestone at 84ft. into alternate clay and sand-belts, with 15ft. of coarse sand drift from 118ft. to the bottom, 133ft. This sand drift is connected with the underground drainage, and through it, after the water in the coralline limestone has been tubed back, the swamp water should be conducted away. From this bore 126ft. of 4in. casing, which had the effect of obstructing the flow of water into the drift, was drawn, and the outside 5in. casing completed to 124ft. into the lower drift; but again, the bore hole is too small for satisfactory experiments during the wet season.

Bore on Section No. 218.—This bore was sunk to 144ft.; the coralline limestone extended to 50ft., and impervious beds of clay with lignite succeeded to 92ft., thence 50ft. of sand and clay beds, followed by coarse drift sand and pebbles.

After taking over the bore 144ft. of 4in. (inner) casing was drawn, as it had the effect of blocking the surface water from flowing away into the drift. The 5in. (outer) casing was left in, and here the surface water flowed away rather freely into the lower drifts when turned on from the adjoining swamp. There is a natural sink hole here, which also gradually absorbs water from the swamp, a connecting drain having been made; the water level is some 6ft. or 7ft. from the surface. This sink hole is doubtless connected with the lower sand drifts.

Result of the Boring.—The existence of sand drifts connected with the underground drainage system of the district is proved in the three bores at depths of 92ft. and 118ft. respectively in the bores on sections 218 and 211 (if sections are correct) and at 82ft. and 140ft. to 150ft. in that on section 3500. In all cases the thick bed of coralline limestone, marl, &c., in the upper portion of the bores becomes saturated with water. During the dry season the water level falls, but in the wet season it rises nearly to the surface. As a matter of course this water has to be tubed back before it can be ascertained to what extent the surface swamp water is absorbed by the drifts. The diameter of the bores is only from 4in. to 5in. It is found that they cannot be kept clear of sand and debris, so as to allow of proper tests being made, and I would therefore suggest that during the coming dry season a shaft or shafts should be sunk to the drainage drift, and the matter tested by this means instead of by boring.

A good site for a test shaft would be on section No. 211, which is close to the main Dismal Swamp. There is a local idea that surface water conveyed away by means of these underground drainage drifts would return to the surface in adjoining localities. This is a fallacy, as the outlet for the water from the drifts must be either in low-lying country near the sea or beneath the sea itself. With regard to smaller swamps, any shafts for this purpose should be sunk within the limits of the swamps, because, in my opinion, the valleys and depressions in Tertiary limestone districts where there are no surface systems of drainage are caused by subsidence of the underground drifts during disturbances of the strata in former times, and therefore the drifts would probably be closer to the surface at these places. (6–7–11.)

THE WILLUNGA SLATE QUARRIES.

Situated S. of and near the township of Willunga.

Martin's Quarry.—The main band of clay slate exposed here has an estimated width of 300ft. The beds strike N.E. by N. and dip about 65° easterly. They are quarried in large slabs, the largest of which noted was 10ft. by 6ft. by 6in. These slabs are easily and cleanly split into slates of any thickness required, and afterwards cut into the sizes required by the trade, or allowed to remain as flags. The faces of these flags and the cleavages are remarkably true and smooth; the cleavage coincides with the bedding.

Bangor Quarry.—This quarry is situated about 1 mile S. by W. of Martin's, and the slate beds here are apparently a continuation of those at Martin's. They strike N.E. by N., and dip about 65° easterly. The working face is about 120ft. wide and 80ft. high, and the faults and joints are favorable for quarrying large flags. The width of the slate bed here is estimated at 400ft. The slates and flags in both cases are of good quality, and have been intermittently quarried and exported for the last 40 years. So far only the upper portions of the beds in both quarries have been worked, and that only to a comparatively shallow depth. Considering their steep dip they will be found persistent in depth, and there will be no deterioration in quality. The character of the country—deep gullies and steep hills—is highly favorable to the opening and working of quarries. The two quarries under notice are about a mile apart, and the slate bands are doubtless continuous; therefore, I believe the supply is practically inexhaustible. (16–6–11.)

REPORTS

BY

The Assistant Government Geologist (Dr. H. Basedow, F.G.S.).

A FEW IDEAS *RE* THE PROPOSED SCHEME OF DEVELOPMENT OF SOME OF OUR NATURAL MINERAL RESOURCES.

Brief comments on one or two of such resources (chosen at random) which occur in practically inexhaustible quantity in South Australia.

Phosphate Rock.—(For full reports on the phosphate deposits of South Australia and their probable origin, by the Government Geologist, *vide* Record, page 334, and Review No. 9).—A difficulty is experienced by our State in competing against the Ocean Island and Christmas Island phosphates, the production in South Australia being only about 5,000 tons for the year. The applications and value of natural phosphate rock are, however, various. The Government Geologist has, I think, already drawn attention to this fact. Phosphorus was until recently prepared only from organic substances such as bones. The rapid strides made in the advancement of modern chemistry have resulted in the profitable extraction of phosphorus from any of its natural minerals. Several of the processes employed in Europe and America are simple. The industry, however, is young, and the deposits of phosphates comparatively rare. One of the oldest-established and largest factories in the world is that of Allbrigh & Wilson, Wednesfield, England, while others are located at Lyon, Frankfort, and in the United States. The world produces about 3,000 tons of phosphorus annually. A recent American publication points out the various uses of phosphorus, such as in the manufacture of matches, vermin poisons, phosphorous acids and their compounds for application in medicine and the arts. It is further used in the precipitation of precious metals, electrotyping, and in phosphor bronze. Several articles and poisons containing phosphorus are at present imported from America, although the United States have themselves to import annually close on 50,000lbs. of phosphorus from the Old World, on which a duty of 18 cents a pound has to be paid.

Clay.—Official reports from other parts of the world all point out that the clay-mining industries are growing. The United States, for example, produce annually about 2,000,000 tons of the better classes of clay, with a value of approximately £600,000; and in addition import about 300,000 tons of best kaolin annually at a cost of about £300,000. In view of the above quotations, taken from a recent bulletin, does it not seem strange that our vast resources of clays should lie idle? We have several deposits in bulk which, on analysis, prove to be identical with other long-established market clays of the world, which go by various names of "ball clay," "slip clay," "paper clay," "fire clay," "stoneware clay," "kaolin," etc., etc.

Mineral Springs.—A third item, and one which is perhaps the least attended to, but no doubt one of the great possibilities, is the utilisation of our mineral waters. That we have such, no one who has compared the analyses of our natural waters with those of other well-known springs, will doubt. We have waters suitable for table and medicinal use. Any natural water which has the property of affecting the functions of the human system comes under the heading of a "medicinal water." Some of these may contain up to 10,000 parts or more of mineral to a million parts of water, and nevertheless be practically inert so far as their physiologic effect on

the body is concerned ; others may contain only a few parts to the million of water and be wonderfully effective. Those having some specific curative value are naturally the most important from a therapeutic standpoint. I have paid particular attention to our mineral waters, and I can produce samples of water which are the equivalent of the long-established and famous spas of the Old World. South Australia is, at the same time, rich in scenic attractions locally round some of these springs, which, together with the superb climate, will guarantee patronage for systematic mineral water treatment, provided the necessary comforts can be given. In America this industry has made rapid strides within the last few years. Exploitation of the water receives every care and liberal consideration. The result is that about 100 new springs are opened up in the various States every year. The total number of waters now commercially worked is over 1,000, and the annual output in gallons about 50,000,000, the net value being £1,500,000. Seeing what other parts of the world are producing, I respectfully suggest that a determined effort be made by the Government to start the above-named industries in South Australia, and to place them on a firm footing. (31–3–11.)

WOLFRAM DISCOVERY NEAR YANKALILLA.

In accordance with your instructions, I inspected the wolfram discovery on Callawonga Creek. The country rock consists of friable decomposed and argillaceous sandstone, which is overlain by comparatively recent detrital deposits of clay with nodular ironstone and broken quartz. The strike of the bedrock is N. 15° W., the dip 20° W. The country is traversed by two systems of reefs, one running in the line of strike, the other more or less at right angles to this direction ; the reefs consist of a compact, white and transparent quartz, in parts ferruginous and cellular. Wolfram has long been known to occur in the district visited, the Government Geologist (Mr. H. Y. L. Brown) having reported it from there as far back as 1893. Since then specimens have been periodically brought to Adelaide for examination and analysis. At the site of Mr. Munro's recent discovery wolfram occurs, together with tourmaline, in one of the dense quartz reefs above referred to, irregularly and sparsely disseminated through the lode in the form of small mineral aggregates. As a result of the disintegration of the reef, a little wolfram was found in the alluvial deposits of the adjacent slopes. On Munro's claim only a small trench about 5yds. long and 2ft. deep has been sunk on the slope of a hill containing a quartz reef. Quartz has, moreover, been napped along another adjacent trench which was sunk a long time ago. A little wolfram was noticed at both sites. There is no reason why the whole district should not be thoroughly prospected for various minerals. (10–4–11.)

REPORTS FORMING ADDENDA TO THE RECORD OF MINES.

By the Chief Inspector of Mines (W. H. Matthews, M.I.M.M.).

Willunga Quicksilver Mines (*vide* Record, page 355, and Review No. 13).—The principal prospecting work done, up to the present, has been confined to the driving of two tunnels in opposite directions from each side of the Finniss River, and the sinking of a shaft.

Saupe's Tunnel.—It has reached a distance of 120ft. from the approach. The character of the material driven through is chiefly sandstone and slate with, in places, small seams and veins of decomposed clay material. The latter, on being carefully examined, discloses small quantities of mercury in globular form. At various points short drives have been driven on the course of the vein, but in each instance the soft mercury-bearing material has gradually disappeared, showing that the veins are not continuous, but simply local splashes that have taken place from the decomposition of the rocks.

Long Tunnel.—This has been advanced a total distance of about 250ft. The character of the material driven through is of a similar class to Saupe's tunnel, disclosing what appears to be small cavities of decomposed matter in which mercury in fine particles can be seen in each instance. Where the decomposed matter has been driven on it has given place to close-grained slate or sandstone of no value.

Shaft.—The shaft, which is in close proximity to the entrance of Saupe's tunnel, is at present 50ft. from surface; at that depth water-level has been reached. The shaft bottom discloses apparently strong silicious lode matter containing a considerable quantity of pyrites, but not of any particular value.

From my examination of this property on this and previous visits in the locality there is no doubt that small quantities of mercury are disseminated over a large area; but up to the present not a sufficient quantity has been discovered to be of any commercial value. It is quite possible that this fine mercury may have travelled for some considerable distance, and its source may be from cinnabar formation not yet disclosed. To test this point I see no better form of prospecting than to continue driving the tunnel or to surface prospect the ranges by a series of cross trenches sunk to from 12in. to 18in. below the solid rock. This would probably expose any lode formation that may appear near the surface. (28–4–11.)

By the Inspector of Mines (Mr. Henry Jones).

Belalie Copper Mine (*vide* Record, page 150, and Review Nos. 10 and 12).—Since the tunnel has been connected with the vertical shaft at the 100ft. level, all the water from the lower workings has been baled out, and the shaft has been timbered and put in good order to the bottom, a depth of 33ft. from the level of the tunnel. The work done at the bottom of the shaft, 33ft. below the tunnel, or 133ft. from the surface, consists of a crosscut driven S. in which the S. lode was intersected at 30ft., and from that point a drive on the course of the lode E. has been carried in a total distance of 54ft. Both the crosscut and the drive have been cleaned out and timbered where necessary, ready for carrying on stoping operations. The lode formation disclosed is fairly defined, and consists of calcite 6in. to 10in. wide carrying seams and patches of copper pyrites and native copper. At a point 16ft. E. from the crosscut the drive and the underlie shaft sunk on the S. lode are connected, thus making good ventilation in all the workings. Stoping is in progress E. and W. from the underlie shaft over the drive, and the lower part of the shaft has been timbered for an ore pass. The W. stope has been carried in a total distance of 16ft. The formation operated on is 2ft. 6in. wide, and consists of a vein of calcite 6in. to 8in. on each wall, carrying high-grade ore, with about

18in. of low-grade material between. The stope from the underlie is in a total length of 30ft.; the lode in the back of the stope and in the face is fully 2ft. wide, with calcite veins on each wall carrying copper glance and malachite.

The lode formation up the underlie shaft to No. 1 adit is well defined, and appears to contain patches of high-grade ore. At 56ft. level over No. 1 adit W. of the shaft, a considerable amount of stoping has been done at one time, and judging from what can be seen in the workings, great quantities of ore must have been obtained. In No. 2 adit, at a depth of 100ft. vertical from the surface and 40ft. N. of the vertical shaft, the N. lode has been intersected, having the same E. and W. bearing as the S. lode, but more vertical in dip, and should, if it continues down as at present, meet the latter at from 600ft. to 700ft. from surface. From No. 2 adit a drive E. in the N. lode is now 18ft. in; the ore body disclosed being from 20in. to 30in. wide of ferruginous quartz, calcite, and micaceous iron, with veins and patches of high-grade copper ore, chiefly malachite, throughout. The lode is well defined with two good walls, and appears likely to continue down to a great depth. In the shallow prospecting pits on the surface the outcrop of the N. lode has been disclosed at various points, showing a width of from 2ft. to 2½ft. of ferruginous quartz and calcite containing a good percentage of copper carbonates. In both the N. and S. lodes the rich ore, judging from what can be seen in the present limited workings, appears to occur in pockets of various sizes, with low-grade ore-bearing material between. The two lodes appear to be permanent, and promise to continue down to a great depth, and when the mine has been opened out and worked on an extensive scale it should produce a great quantity of high-grade ore. A small fault has been discovered in the present workings bearing N. 30° E., and at points it has crossed the lodes at 133ft. and 100ft. levels; it does not appear to have displaced or affected the formation in any way.

Twelve samples of the lode material taken from the various workings gave the following results:—

No. 1.	W. end, S. lode, 133ft. level	5·7 %	copper,	6in.	wide
No. 2.	E. " " " " ...	6·9 %	"	8in.	"
No. 3.	Face W. stope, S. lode, 100ft. level	29·6 %	"	8in.	"
No. 4.	" " " "	36·4 %	"	6in.	"
No. 5.	Face E. stope " "	13·6 %	"	6in.	"
No. 6.	Face E. drive, N. lode "	21·8 %	"	20in.	"
No. 7.	Dressed ore bagged	40·4 %	"		
No. 8.	Seconds bagged	19·6 %	"		
No. 9.	Outcrop, N. lode, 8ft. deep	14·7 %	"	vein 8in.	wide
No. 10.	" "	1·0 %	"	" 27in.	"
No. 11.	Outcrop N. lode, No. 2 hole, 8ft deep	1·8 %	"	" 24in.	"
No. 12.	Outcrop N. dump	8·7 %	"		

(16–1–11.)

Kitticoola Gold Mine (*vide* Record, page 70, and Reviews Nos. 9 and 13).—The principal work carried on at the mine for the last six or seven months has been confined chiefly to the development of the ore body at the 180ft. level, with a view of proving the actual extent of the payable ore at that level N. of the main underlie shaft, and to ascertain the quantity available for battery treatment. The work of widening the N. drive, which had previously been driven narrow in the footwall portion of the formation, was started at a point 74ft. N. of the underlie shaft, and has now been carried in for length of 166ft. up to No. 2 winze, and for the full width of the ore channel. The formation disclosed along the drive for the distance operated on is wide in places and of irregular nature, and the ore channel at various points has been slightly disturbed by small faults or intrusive belts of country rock cutting across the formation in a diagonal direction from foot to hanging wall with a northern dip, and the ore body between the intrusive belts is in fairly long

shoots dipping N. For about 75ft. in length the N. drive has been timbered, and ore passes put in preparatory for stoping operations over the drive. The ore-bearing material disclosed in the stope and along the drive for the distance operated on consists of ferruginous quartz, iron, and decomposed material 2ft. 6in. to 6ft. wide, probably an average width of from 3ft. 6in. to 4ft. The whole formation from the 240ft. level up to the 120ft. level, and for a length of 166ft., appears highly promising, and comparatively intact except for the ore extracted in winze sinking and driving; and, taking the average width of the formation as mentioned above, this block alone, independent of what ore may be discovered when the mine is being further developed, should produce from 7,500 to 8,000 tons of ore; and judging from the returns of several parcels of ore treated recently from the present workings by the five-head mill on the mine, it should give a very fair profit after paying all working expenses.

The first parcel of ore extracted from the 180ft. level workings by the present party was sent to the Mount Torrens Cyanide Works for treatment, and the 15 tons treated gave a total return of 18ozs. 17dwts. 8grs. of gold. Encouraged by the high returns in gold from the first parcel, and having such a great quantity of ore of similar value available for stoping, the tributers procured and erected a five-head battery of 10cwt. stamps; also engine and boiler, and the necessary pumps to supply the battery with water. This plant has been erected on a convenient site near the mouth of the adit, where the ore can be trucked direct from the 180ft. level workings to the ore bin, close to the plant. Since the erection of the plant has been completed, the following six parcels of ore have been treated:—

Oct.	15th, 1910,	36 tons	treated	gave a return of	15oz. 2dwts. 6grs.
Oct.	27th, "	30 tons	"	"	20ozs. 12dwts. 6grs.
Nov.	16th, "	70 tons	"	"	30ozs. 9dwts.
Dec.	10th, "	50 tons	"	"	24ozs. 14dwts.
Dec.	24th, "	60 tons	"	"	25ozs. 19dwts. 16grs.
Jan.	25th, 1911,	50 tons	"	"	22ozs.

The gold returns from the 311 tons of ore treated up to date is highly encouraging, and as it has paid more than working expenses with the present small plant, the future prospects of the mine are very promising, and should, when equipped with larger and more modern plant, become a highly profitable property. The above returns of gold were obtained by amalgamation only; there are still from 3dwts. to 4dwts. of gold in the tailings. At the time of my inspection I took 19 samples of the lode formation from various parts of the workings. These were taken more to determine the extent of the gold-bearing part of the formation than to test its actual value, for to accurately sample a lode of this nature, in which the largest portion of the gold it contains is encased in vughs and small pockets of iron oxide, would require considerable care and time, and would then not be equal to battery test, which with this kind of ore is far more reliable than any sampling. The 19 samples taken gave the following results:—

Nos. 1, 2, and 3.	Battery tailings					3dwts., 2dwts., and 4dwts.	gold per ton.
No. 4.	Battery slimes					3dwts.	"
No. 5.	From 180ft. level, S. stope,		lode	6ft.	wide ..	6dwts.	"
No. 6.	" " "	hanging wall,	"	34ft.	" ..	3dwts.	"
No. 7.	" " "	N. stope,	"	12ft.	" ..	2dwts.	"
No. 8.	" " "	"	"	4ft.	" ..	11dwts.	"
No. 9.	" "	N. of winze, N. stope,	"	45ft.	" ..	16dwts.	"
No. 10.	" "	" 20ft. N. stope.	"	35ft.	" ..	10dwts.	"
No. 11.	" "	" 70ft. N. H. wall,	"	15ft.	" ..	4dwts.	"
No. 12.	" "	" " "	"	15ft.	" ..	12dwts.	"
No. 13.	" "	" back of level N.,	"	4ft.	" ..	3dwts.	"
No. 14.	" "	S. of 2 winze,	"	5ft.	" ..	3dwts.	"
No. 15.	" "	" 1 " 30ft.	"	5ft.	"	2ozs. 9dwts.	"
No. 16.	" "	underhand stope,	"	6ft.	" ..	6dwts.	"
No. 17.	" 120ft. level,	top of rise,	"	4ft.	" ..	6dwts.	"
No. 18.	" "	" south end,	"	4ft.	" ..	6dwts.	"

Lady Alice Gold Mine (*vide* Record, page 261).—The pumping plant recently erected on the main vertical shaft has been dismantled and removed from the property; the water, which was pumped out to within a few feet of the 250ft. plat, is rising in the shaft, and is now up to the 200ft. level. The principal work carried on at present on the property consists chiefly of cleaning out and repairing Goddard's Shaft, which is situated on the side of Hamlin's Gully, and is down to a depth of 45ft. When the repairing of the shaft is completed to the bottom, crosscutting the country both N. and S. will be started to explore this block of ground, on which a considerable amount of alluvial gold was obtained in the early days of Barossa. About half a mile farther down the gully prospecting work is in progress, with a view of picking up the continuation S. of the New Year's Eve lode. Three small pits have been sunk to 8ft. each, and in the most westerly pit a lode formation has been intersected 1ft. 10in. wide of quartz and sandstone. It appears promising for gold, and should be further explored by driving on its course. Two samples of the lode, taken from the N. and S. sides of the pit, gave traces of gold. (26–1–11.)

Gordon Reward Gold and Rutile Mine, near Williamstown (*vide* Record, page 209, and Reviews Nos. 8, 10, and 13).—At various points along the brow of the hill, E. of the main workings, prospecting work is in progress. Several pits have been sunk recently through the clay and boulder deposit, varying in depth from 5ft. to 11ft., with a view of testing the value and extent of this promising surface deposit, and proving a greater area along the hill. Encouraging prospects of both gold and rutile are obtained in the greater number of these trial pits; and in all the workings the portion of the deposit proved to contain the richest gold is the bottom foot overlying the bedrock. At one time considerable quantities of rich gold were obtained in the main workings at comparatively shallow levels. Should that run of gold be discovered in the present workings to continue along the hill a large area of new ground will be made available for future operations. At the N. end of the main workings a vertical shaft has been sunk to a depth of 25ft., and from the bottom of the shaft a crosscut has been extended E. 8ft., at which point a highly ferruginous formation of claystone was intersected, which contained a fair percentage of ferric oxide. From the crosscut drives have been extended in the formation S. for a distance of 36ft. and N. 12ft. The formation is of a considerable width, and the 5ft. operated on in driving appears of fair quality for use as pigment. Fifteen tons of the material extracted from the workings have been sent to market. Two samples taken of the lode formation from the N. and S. drives at the 25ft. level gave the following results:—

No. 1. S. drive, insoluble material 88·71 %, ferric oxide 4·83 %
No. 2. N. drive " " 85·97 %, " 7·60 %

Five samples taken from the prospecting pits gave the following results:—

No. 1. From No. 1 pit, 5ft. deep, gold, nil; rutile, 0·6 %
No. 2. From No. 2 " 5ft. " " " " 0·6 %
No. 3. From No. 3 " 4ft. " " " " 0·4 %
No. 4. From No. 4 " 10ft. " " " " 3·4 %
No. 5. From No. 4 " 10ft. " " " " 1·3 %

(27–1–11.)

Glamorgan (Alma Extended) Gold Mine (*vide* Record, page 198, and Review No. 11).—No underground work has been done at this mine for some time, and the water is up in all the workings. The treatment plant on the mine, consisting of a 10-head battery and Denny's pans, all driven by suction gas engine, has been operating until recently on lode material from the Ajax, and also on two parcels of ore from the old surface dumps at the Glamorgan. The first parcel of 50 tons gave a return of 8dwts. of gold per ton, and the second parcel of 153 tons gave a

return of 10dwts. of gold per ton. A large sum of money has been spent in shaft-sinking and driving at various levels in the mine; but, as far as I can find out, comparatively very little stoping had been done on any of the lodes when the mine stopped. Judging by the gold value per ton obtained from the two parcels above treated, the future prospects of this mine are very encouraging and fully warrant further exploration work being done, when it is quite possible that, with the modern system of mining and ore treatment, the mine could be made a highly remunerative one. (14–2–11.)

Ajax Gold Mine (*vide* Record, page 196, and Reviews Nos. 8 and 11).—Underground work at this mine has been suspended for the present, as the cartage of the lode material from the mine to the Alma Extended plant for treatment was found to be too expensive for this class of ore. Mining on this property and others in the locality has been greatly hampered for years owing to there not being sufficient water to run the crushing plant and treat the ore on the mine. Recently the Government boring plant put down a few holes in the vicinity of the mine, and a highly promising water channel was intersected at 130ft. from the surface. On the site of No. 2 bore, situated ¾ mile N. of the mine, a well has been started and sunk to a depth of 29ft. When the sinking of the well has been completed there probably will be a good supply of water for all purposes, and the mine can be worked up to the full capacity of the plant, when from 70 to 80 men can be employed, and the ore extracted from the workings crushed and treated with the plant on the mine. At present there are about 400 tons of ore, recently extracted from the workings, stacked on the surface ready for treatment. (14–2–11.)

Union Jack Gold Mine.—Situated adjoining the Ajax Gold Mine. A well-defined lode formation traverses the block, bearing N.E. and S.W., and dipping N.W. at an angle of 45°. A considerable amount of work appears to have been carried on at one time on the property, principally shaft-sinking. No. 1, or main underlie shaft, is situated on the brow of the hill, 100ft. above the level of the plain, and has been sunk to a depth of 200ft. This is a large shaft; it could be utilised for hauling purposes, and if equipped with a small winding plant the lode could be operated on at 200ft. level by driving on its course both ways, and thus render available a great amount of ground for stoping. For about 15 chains W. from the main workings several shafts have been sunk in the lode for depths of from 8ft. to 60ft., and recently a considerable amount of open working has been done along the outcrop of the lode between the various shafts, disclosing the ore body for nearly the whole length of the property. The lode consists chiefly of ironstone and quartz 12in. to 24in. wide, carrying gold. In all the workings the lode is well defined, containing fair average value in gold, and should pay well if the ore could be treated on the mine. The future prospects are encouraging, and now that a good supply of water for the treatment of the plant is likely to be obtained from the Government well in the vicinity, the mine should, when opened out properly and worked on a more extensive scale, become a remunerative one. Five samples of the lode taken from the various surface workings gave the following results on assay :—

No. 1. From shaft 10ft. deep, lode 18in.	17dwts.	gold per ton
No. 2. From outcrop, length of 4 chains	9dwts.	" "
No. 3. Surface dump, No. 3 shaft	8dwts.	" "
No. 4. Open workings for length 3 chains	6dwts.	" "

(15–2–11.)

King's Bluff Gold Mine (*vide* Record, page 223, and Reviews Nos. 8, 9, 10, and 13).—Owing to the great difficulty in hauling and handling the ore from No.1 and No. 2 underlie shafts, underground work in both shafts has been temporarily suspended until the sinking of the new vertical shaft has been completed. This

is situated about 10 chains S. from the mouth of No. 1 underlie, and in a direct line with its dip. It is 6ft. by 4ft. clear of timber, and has reached a depth of 30ft. Judging by the depression in the ground surface between the two shafts and the angle of the underlie, the vertical shaft should intersect the formation operated on in the latter at about 270ft. from the surface. When the sinking is completed and the new and old workings connected, the working of the mine on a more extensive scale will be greatly facilitated, and the ore material from the various workings will be hauled and landed on the surface at less cost than it could be previously done, when it had to be hauled up through an irregular underlie. Two samples of the leaders intersected in the new shaft contained no value. Three samples of pyrites from the deep levels each gave traces of gold. (16–2–11.)

Radium Hill Mine, near Olary (*vide* Record, page 361, and Reviews Nos. 11 and 12).—A large lode formation traverses the property bearing N. 40° E., dip S.E. The outcrop can be traced on the surface for fully 600ft. No. 1 shaft on the underlie of the lode has been sunk to a depth of 80ft.; the ore body disclosed all the way down the shaft to the 60ft. level is well defined and from 3ft. 6in. to 4ft. wide, and consists of quartz, black mica (biotite), and titanic iron (ilmenite); the carnotite occurs in yellow incrustation in the cavities and joints of the formation. At the 60ft. level the ore body has been cut off on a fault, and the shaft from that point to the 80ft. level was sunk in disturbed country with isolated bunches of ore through it. From the bottom of the shaft a drive has been carried in E. for a distance of 48ft.; the vein followed in the shaft consists of schist 12in. to 18in. wide, containing small patches of ore. The drive S. at the same level is in a total distance of 20ft. A nice bunch of ore was obtained in the drive, but it pinched and became very small going S. No. 2 shaft, situated about 300ft. S.W. of No. 1, has been sunk in the lode to a depth of 80ft. The ore body down the shaft to the 70ft. level is well defined and fully 4ft. wide. At that depth the formation has been displaced on what appears to be the same fault as the one traversing No. 1. At the 75ft. level a crosscut has been extended W. for a distance of 12ft., and at that point the formation below the fault was intersected. From the crosscut a drive on the lode N.E. has been carried in for a distance of 80ft.; the formation disclosed in the drive is from 1ft. to 2ft. 6in. wide. In the drive at a point 40ft. from the shaft a winze has been sunk to a depth of 45ft., which, at the time of my visit, was full of water and could not be inspected; but the manager informed me that the ore body in the winze was going down strong. At several points on the surface E. from the main lode there are strong indications of other formations traversing the property, and are well worth prospecting to prove their values. There are considerable quantities of ore available in the present workings and a fair amount on the surface, all showing rich incrustation of carnotite; and now that the treatment of this complex lode material has been solved, the mine will have a reasonable chance to become a highly profitable venture. Five samples of ore taken from the various workings were analysed at the School of Mines, Adelaide, and gave the following results :—

	Uranium Oxide $V_3 O_8$	Radio-Activity.
No. 1. Schist bottom drive	Trace	Faintly active
No. 2. Back of drive	0·5 %	Active
No. 3. From 60ft. level	0·9 %	Active
No. 4. Ore dump, No. 1 shaft	1·6 %	Active
No. 5. Ore dump, No. 2 shaft	1·7 %	Active

(17–2–11.)

Copperlinka Gold Mine (*vide* Review No. 13).—Situated 10 miles S. from Olary. A considerable amount of work has been carried on recently on the property, chiefly shaft-sinking and stoping ore at 30ft. level. No. 2 shaft, situated

WILLUNGA SLATE QUARRIES.

MARTIN'S QUARRY.

Photos. by Government Geologist.

BANGOR QUARRY.

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about 45ft. S. from No. 1, has been sunk 18ft. vertically. At that depth it holed through to the back of the S. drive. Over the drive between the two shafts a fair amount of stoping has been done in a ferruginous ore body 3ft. to 6ft. wide, carrying gold. Several parcels of ore taken from the workings have been treated at the Government Cyanide Works, Petersburg, yielding from 14dwts. to 15dwts. of gold per ton. At a point 43ft. in the S. drive a winze is in progress, and is down 17ft. The ore-bearing material disclosed is ferruginous quartz and clay slate, 12in. to 18in. wide on the footwall, with 2ft. to 2ft. 6in. of intrusive rock on top, between the vein of ore and the main hanging-wall. This intrusion in the ore channel is probably local, and may not extend far. To further ascertain its extent, and test the ore channel at a greater depth, the best plan would be to sink a new shaft some distance S.W. from the present workings, to intersect the lode formation at from 70ft. to 80ft. This would determine the character of the ore body going down, and would render available a great amount of ground for stoping purposes. The several samples taken from various parts of the mine and the ore treated prove that the formation is gold bearing for a considerable distance, and that it is well worth being further developed.

No. 1. Sample from bottom of winze gave 5dwts. of gold per ton
No. 2. " south side of winze " 5dwts. " "
No. 3. " north " " 2dwts. " "
No. 4. " face of S. drive " 11dwts. " "
No. 5. " ore bagged " 4dwts. " "
No. 6. " outcrop E. lode, 4 chains S. gave nil
No. 7. " outcrop W. lode, 4 chains S. gave 4dwts. of gold per ton

(18–2–11.)

Lux Gold Mine (*vide* Record, page 237, and Reviews Nos. 9 and 10).—Situated about 14 miles E. from Olary. The new underlie shaft, situated 40ft. N. from the old workings, has been sunk to a depth of 90ft. on Bayes lode. At the 32ft. and 64ft. levels a little driving and stoping has been done W. for a length of 20ft. The lode fomation disclosed in the workings consists chiefly of ferruginous quartz and sandstone, 3ft. to 6ft. wide, carrying gold. In various parts of the workings strong leaders of quartz are noticeable in the foot and hanging walls intersecting the main lode. Some of these appear very promising for gold, and are worth a little work being done on them each side of the main ore channel to prove their values. A considerable quantity of the ore extracted from the various workings has been treated by battery and cyanide process, and gave a return of from 8dwts. to 19dwts. of gold per ton. There are several other promising quartz reefs traversing this property. The outcrops are very prominent, and can be traced on the surface for considerable distances. Shafts have been sunk on some of the reefs to a depth of 20ft. to 60ft., and a fair amount of driving and stoping has been done at shallow levels. The lodes disclosed in the various workings are chiefly quartz, 3ft. to 4ft. wide, carrying gold. Several parcels of ore extracted from the workings were treated and gave a return of from 6dwts. to 9dwts. of gold per ton, which apparently did not pay owing to the great distance to cart the ore, but would probably give a fair amount of profit if treated by an up-to-date plant on the mine. Nine samples of the lode material taken from the various parts of the workings gave, on assay, the following results :—

No. 1.	Hanging walls, leaders, for	5ft., 32ft. level	2dwts. gold per ton.
No. 2.	" " "	5ft., " "	8dwts. " "
No. 3.	E. side of shaft	3ft., 64ft. "	2dwts. " "
No. 4.	" "	3ft., 55ft. "	1oz. " "
No. 5.	" "	3ft., 45ft. " ..	2oz. 10dwts. gold per ton.
No. 6.	Pyrites ore, old shaft	270ft. "	4dwts. gold per ton.
No. 7.	Surface dump	.....	2dwts. " "
No. 8.	John Brown lode	.....	7dwts. " "
No. 9.	" " " outcrop	.....	Trace " "

(18–2–11.)

Cutana Copper Mine (*vide* Reviews Nos. 9 and 10).—The main shaft on the property has been sunk to a depth of 30ft. At that level a drive in the lode has been extended S.W. for 25ft., and the ore over the drive has been stoped out up to the surface. At the same level the N.E. drive is in 10ft. from the shaft. The lode in the workings is chiefly ferruginous quartz, 2ft. to 3ft. 6in. wide, containing seams and bunches of copper ore, chiefly malachite and copper glance; the lode is strong and well defined, and likely to continue down to a great depth. Several parcels of ore from the workings have been sent to market, giving good returns. The last parcel of dressed ore sent away gave a return of 30 per cent. copper. Sample taken from a small quantity of dressed ore on the surface gave, on assay, 34·8 per cent. copper, and one taken from the jigged ore gave 15·5 per cent. copper. In the present limited workings the ore body disclosed appears promising, and the future prospects of the mine are very encouraging. (18–2–11.)

Winkler's Copper Mine.—Situated about ¾ mile S.W. from the Lux Mine. A large lode formation traverses the property, bearing N.E., dip N.W., on which a fair amount of work was carried on at one time, but at present the mine is idle. The main shaft, sunk in the lode, is down a total depth of 70ft., and it appears that a little driving and stoping has been done from the shaft, and a fair amount of ore extracted. At a point 3 chains S. from the main shaft, operations on the lode have been carried down to a depth of 15ft. No. 2 shaft, situated N. of the main shaft, has been sunk to a depth of 35ft. A parcel of 2 tons of ore extracted in the operation gave a returnof 22 per cent. copper. The lode disclosed in the various workings consists chiefly of quartz, with stains and bunches of carbonates all through the matrix. A sample taken from one of the spoil heaps on the surface gave 4·5 per cent. copper. (19–2–11.)

Mutooroo Copper Mine (*vide* Record, page 97, and Reviews Nos. 8, 9, and 10).—The precipitating plant on the property is continuously at work treating water from the main workings, which contains a high percentage of copper in solution. The last 5½ tons of precipitates sent to the market gave 69 per cent. copper. At the S. end of the property work is carried on by tributers, stoping and driving at shallow levels. The last parcel of 3½ tons of ore extracted from the workings gave 15 per cent. copper. (22–2–11.)

Mutooroo West Copper Mine (*vide* Record, page 98, and Reviews Nos. 8 and 9).—In the large body of sulphide ore traversing this property two shafts, about 200ft. apart, have been sunk to a considerable depth, proving the formation to be going down strong and carrying copper. At present the mine is idle and a caretaker in charge. (23–2–11.)

Perseverance, formerly Winkler's Silver-lead Mine (*vide* Record, page 194, and Reviews Nos. 9 and 10).—Situated 2 miles S.W. from Lux Mine. From the vertical shaft at the 33ft. level, driving N.W. on the course of the lode is in progress, and the drive is in a total distance of 16ft. from the shaft. The formation disclosed consists of decomposed schist and a little quartz, 3ft. wide. The ore occurs in seams and nodules of galena in the lower portion of the lode, near the footwall, for a width of 12in. It appears a promising formation, well worth being tested to a greater depth. Three samples of the lode material taken from the workings gave the following results:—

No. 1. From face of N.W. drive, 7·4 % lead, 16dwts. silver.
No. 2. From W. underlie, nil.
No. 3. Surface ore dump, 60·6 % lead, 4dwts. silver.

(19–2–11.)

Uncle Tom Silver-lead Mine (*vide* Record, page 191, and Review No. 10).—Situated ½ mile E. from the Perseverance. No work has been done on this property for a considerable time. A fair amount of prospecting to a shallow level has been carried on in the past, and the lode formation disclosed in the old working appears favorable and likely to continue down. A sample of ore taken from a pit 9ft. deep gave 70·2 per cent. lead, 24ozs. silver. (19–2–11.)

Faugh-a-Ballagh Copper Mine.—Situated 4 miles N.E. from Outalpa Sheep Station. A fair amount of prospecting work has been done on this property, disclosing copper bearing lode material at various points on the block, and at the S. end a large quartzite formation is exposed in an open cut, showing stains of green and blue carbonates for a width of 8ft. and to a depth of 4ft.; but the ore extracted proved to be of such low grade at this point that it would not pay for further working. Near the S.E. corner of the block a small prospecting shaft has been sunk to a depth of 10ft. in lode formation, bearing N. and S., and dipping vertically. The ore body disclosed in the shaft is 2ft. wide, and consists chiefly of magnetic iron stained with copper carbonates; a small sample taken from the ore for 2ft. wide gave 3·2 per cent. copper. The lode is well defined, and appears likely to continue down to a great depth. It fully warrants further work being done to prove its extent and value. No. 2 shaft, situated on the side of the hill, has been sunk to a depth of 15ft. in the lode formation bearing N.W., and dipping vertically. The ore body disclosed is well defined, and consists of magnetic iron 12in. to 18in. wide, carrying carbonates and copper pyrites. Sample of ore taken from the bottom of the shaft gave 4·5 per cent. copper. About 2 chains N.W. from No. 2 shaft in an open cut 20ft. long and 8ft. deep, the formation is 2ft. to 3ft. wide, stained with green carbonates. One ton of ore obtained from these workings gave 8 per cent. copper. W. from the last workings a large iron formation traverses the hill, bearing N.W. and S.E.; the outcrop can be traced on the surface for a considerable distance. A sample of the surface ore taken gave no value. On the W. side of the hill a main shaft, 6ft. by 4ft. in the clear, has been sunk to a depth of 52ft. in a lode bearing N.W. and S.E., and dipping N.E. into the hill, which will probably at depth junction with the iron formation. The ore-bearing material in the main shaft is chiefly quartz and quartzite, carrying carbonates and patches of copper pyrites. Six tons of ore taken from these workings gave 15 per cent. copper. (20–2–11.)

Lykke Viking Gold Mine, formerly Scotchman and Ironclad (*vide* Record, page 267, and Review No. 11).—Situated at Teetulpa. The principal work in progress at present on the property is the sinking of Lykke's new underlie shaft on an E. and W. formation at a point where it junctions with the Ironclad lode. The shaft is down a total depth of 100ft. The formation disclosed is from 2ft. to 3ft. wide, of promising looking quartz. Sample taken of the ore from the bottom of the shaft showed on assay that the lode at that point contained no value; but the main Ironclad lode so far in the shaft is intact, and probably when it has been opened out and operated on it will be found to carry good values. At the 40ft. level, driving W. in the formation has been extended a distance of 33ft. The ore body disclosed in the drive is from 2ft. to 6ft. wide, chiefly quartz and iron carrying a trace of gold. The treatment plant erected on the mine consists of a three-head battery (rapid crusher) driven by an oil engine 8 H.P. A supply of water for crushing purposes is obtained from an adjacent shaft, on which a pump and windmill have been erected. Parcels of ore treated by the plant gave a return of 5dwts. of gold per ton, and the tailings contain 2½dwts. Sample taken from the Ironclad lode near the new shaft gave 9dwts. gold per ton.

(24–2–11.)

Homeward Bound Gold Mine (*vide* Record, page 245, and Reviews Nos. 9 and 11).—No. 2 main underlie shaft has been sunk to a depth of 202ft. from the surface. The ore body disclosed in the shaft to a depth of 175ft., is well defined, and consists of ferruginous calcite 6in. to 12in. wide, carrying gold and bismuth. From the 175ft. to the 190ft. level the lode has been disturbed on a fault coming in from the E. side of the shaft and crossing it diagonally for a distance of 15ft. down. In the vicinity of the fault the formation is from 1ft. to 4ft. wide, mostly quartz carrying no value. The last 12ft. of the sinking is in country rock, which appears to be getting more settled S. of the fault. Judging by the trend and angle of the fault it appears to be a downthrow to the S., and to prove the extent of the displacement in the lode it will be necessary to further sink the shaft 20ft. to 30ft. into the settled country, then to put in short crosscuts N. and S. to locate the ore body. At the 175ft. level stoping has been carried in for a short distance both E. and W. from the shaft. The ore is from 9in. to 12in. wide, of ferruginous calcite, carrying gold and bismuth; 4½ tons of the ore from this part of the mine, treated at Petersburg Cyanide Works, gave a return of 15dwts. 18grs. gold per ton.

At a point W. from the main workings on the line of the lode, and near the Klondyke boundary, a prospecting shaft has been sunk recently. The lode was intersected at a depth of 14ft., carrying payable values. Stoping is now in progress, and has been carried in 25ft. N. from the shaft. The ore body is similar in size and character to that in other parts of the mine, but at this point it appears to contain fairly rich patches of gold associated with bismuth. About 12 tons of the ore recently extracted from the workings are now stacked on the surface ready to be picked and dressed for market. A sample of the bismuth ore taken from the dump gave, on assay, 12ozs. 11dwts. gold per ton. A sample of picked ore from the 175ft. level gave 3ozs. 6dwts. gold per ton. A considerable amount of work has been done along the line of lode, proving it to be gold-bearing for a distance of nearly one mile, and to a depth in one shaft of 175ft.; but at present the working of the mine on a proper system and larger scale is greatly hampered in consequence of the inadequate water supply for running the treatment plant. A great quantity of low-grade ore now at grass would pay well if treated on the mine. The future prospects of this property appear very promising, and warrant the expenditure of a little capital in putting down a few bore holes in the vicinity of the mine S. from the present workings, and if a sufficient water supply should be discovered the mine would have a fair chance to become payable. (25–2–11.)

New Milo Gold Mine (*vide* Record, page 322, and Reviews Nos. 10 and 11).—Situated at Wadnaminga. In the main underlie shaft, at 370ft. level, the drive W. has been extended to a total length of 193ft. from the shaft. At that point stoping is in progress, the ore body consisting of ferruginous quartz 2ft. 6in. wide, carrying good gold. Sample taken for full width of the lode gave, on assay, 6ozs. 12dwts. gold per ton. A sample taken from a small leader on the footwall 12in. from the main body gave 3dwts. gold per ton. At the 30ft. level, E. of the underlie shaft, a little stoping work has been done recently on a vein of ore 6in. wide. A sample taken from the vein in the face of the stope gave 7dwts. gold per ton. About 3 tons of ore extracted from the latter workings and 9 tons from the 370ft. level have been bagged ready for sending away to the Government Cyanide Works, Petersburg, to be treated. The ore body at the 370ft. level in the present workings is strong and well defined, and appears likely to continue down to a great depth. (26–2–11.)

Virginia Gold Mine (*vide* Record, page 323).—Situated at Wadnaminga. At one time a considerable amount of work was carried on at this mine, when a number of underlie shafts were sunk to various depths on the property; and the ore body has been operated on, apparently, in some of the shafts to a considerable depth,

and along the line of strike for fully 1,000ft.; and, judging from the amount of work done, there must have been some thousands of tons of payable ore extracted from the various workings. The E. part of the mine, where the largest amount of work was done, is in a dilapidated state, and some of the shafts and drives have fallen in, which made it impossible at the time to examine the ore body in the lower levels in that section of the workings. At the W. part of the mine all the workings in that section are in fairly good order, and consist of two vertical shafts, 180ft. apart, sunk to 50ft. each. The shafts are connected by a drive extended in the lode at that level. Above the drive for a length of 150ft. a fair amount of stoping has been done and a considerable quantity of ore extracted. The ore body disclosed in the various stopes consists of ironstone and quartz veins, 4in. to 18in. wide, with slate bands between, for a width of 2ft. to 3ft.; the gold occurs in these veins. A sample taken from one of the veins 6in. wide gave, on assay, 1oz. 6dwts. of gold per ton. At the 50ft. level, 20ft. W. from No. 2 vertical shaft, underhand stoping is in progress. The lode operated on consists of quartz and ironstone, 15in. to 18in. wide, is well defined, and appears likely to continue down to a great depth. A sample taken for the full width of the lode gave 1oz. 10dwts. of gold per ton. To further develop and open out the W. section of this mine No. 1 and No. 2 shafts are well situated, and should be continued down in the lode from present level, and at every 100ft. drives could be put in to connect the two shafts. This would give good ventilation throughout the workings, and render available large blocks of ground for stoping. The present owners of the property are preparing for the erection of a treatment plant on the mine to treat the ore already in sight at the 50ft. level; but, as mentioned above, shaft-sinking should be carried on as soon as convenient, to assure a further supply of ore to keep the plant fully at work. (26–2–11.)

Hecla Copper Mine, formerly Walparuta (*vide* Record, page 144, and Review No. 11).—Situated 16 miles N. from Mannahill. The principal work in progress at present is the sinking of a new vertical shaft on No 2 formation. The shaft is 7ft. by 4ft. in the clear, and is down to a depth of 21ft. The ore-bearing material disclosed is 2ft. 6in. wide, and consists of mica schist, stained with carbonate and carrying copper pyrites. Samples taken from the shaft gave the following results :—

No. 1.	Bottom of shaft, for 2ft. 6in. wide,	1·4 %	copper,	and trace	of gold.
No. 2.	W. end of " " "	4·3 %	"	and 1dwt.	"
No. 3.	E. end of " " "	0·6 %	"	and trace	"
No. 4.	From small parcel dressed ore ..	12·6 %	"	and 6dwts.	"

In the the present limited workings small patches of good ore have been obtained, and the matrix carrying the ore appears to be very promising for continuing down to a great depth. To further prove this formation and the parallel one, a short distance S.E. of the workings, the present shaft should be continued down to a reasonable depth, then drives could be extended in the formation to determine the width and value of the ore, and also crosscuts could be made at the same level to determine the width and value of the parallel formation. (27–2–11.)

Golden Record Gold Mine (*vide* Record, page 321).—Situated at Wadnaminga. A fair amount of prospecting work has been recently done along the outcrop of the Record reef for a length of fully 2 chains, and to a depth of from 6ft. to 8ft. About the centre of the open workings shaft-sinking is in progress on the underlie of the lode, and is down to a depth of 15ft. The vein of ore disclosed in the workings consists of quartz 6in. wide. A sample of the vein at the bottom of the shaft gave no value. (26–2–11.)

Ochre Mine, near Oodlawirra (*vide* Reviews Nos. 8, 9, and 11).—Inspected on March 1st. A considerable amount of work has been done on this block, chiefly shaft-sinking and driving at a depth of 62ft., in large formation of iron oxide, and a considerable amount of ochre was obtained in the various workings. At present there are several tons of ochre bagged on the surface ready to send away. At the time of my visit underground work had been temporarily suspended and a caretaker in charge. (1–3–11.)

Dustholes Gold Mine (*vide* Record, page 214, and Reviews Nos. 8 and 13).—A large amount of shallow prospecting work has been done on this property, and considerable quantities of ore from it treated at the Government Cyanide Works, Petersburg, yielded from 6dwts. to 10dwts. of gold per ton. The ore-bearing material disclosed in the various workings is from 20ft. to 25ft. wide, and consists mainly of quartzite, slates, and sandstone, with numerous veins of quartz and ironstone 3in. to 8in. wide and from 12in. to 36in. apart intersecting the formation at right angles to its dip. The gold occurs in the small ferruginous veins; the other parts of the formation do not appear to carry any value. Recently an underlie shaft was started in the formation and sunk to a depth of 50ft.; at that level a crosscut was put in across the lode, and several small leaders of quartz were intersected. Samples taken from three of the leaders and assayed gave only a trace of gold each. The present shaft should be continued down to test the ore-bearing material to a greater depth, where probably other veins would be intersected carrying good values. (2–3–11.)

New Mount Grainger and Medora Gold Mine (*vide* Record, page 250, and Reviews Nos. 8, 9, and 13).—The new vertical shaft to prove and develop the E. lode traversing this property has been sunk to a depth of 70ft., and from the bottom of the shaft a drive has been extended S.W. for a distance of 35ft. At a point 17ft. in from the shaft a winze has been carried down to a depth of 20ft. From these workings a large amount of high-grade ore has been obtained. The ore-bearing material operated on is of a considerable width, with no defined walls showing. A sample taken from all round the bottom of the winze and assayed gave 3ozs. 15dwts. of gold per ton. This proves that ore of high value is still going down, and fully warrants the sinking of the present shaft to a much greater depth, and then crosscut both ways from the shaft to further determine the full width and extent of the gold-bearing material. At the 73ft. level in Jones's underlie shaft stoping is in progress on veins of ore carrying high values. A sample taken for a width of 5ft. gave, on assay, 19dwts. of gold per ton, and one sample taken from a small vein of ore 2in. to 3in. wide, in the face of the stope, gave 4ozs. 7dwts. of gold per ton. This auriferous belt of slate country, from which such rich gold has recently been obtained in the E. workings, appears to traverse the whole length of the property, parallel with the main lode; the leaders crossing the slate beds appear likely to intersect the latter, and probably at points of intersection rich shoots of ore will be found. The main working shaft on the property has reached a total depth of 300ft., or about 40ft. below water level; but the water making at that depth was not sufficient in quantity to supply the crushing plant on the mine. Recently a contract was let to sink the shaft another 50ft., and it is anticipated that thereby an ample supply of water will be obtained for working the plant continuously, and treating the ore on the mine. Work is in progress overhauling and getting the plant and machinery in proper working order, ready to resume crushing operations as soon as the necessary supply of water has been obtained and the shaft-sinking completed. Judging from what can be seen in the various workings on the property and the gold returns from large quantities of ore already treated from the mine, the future prospects appear very encouraging, and with an adequate supply of water the mine will have a fair chance to become a remunerative one. (2–3–11.)

Wandilta Copper Mine.—Sinking of the main vertical shaft 45ft. E. of No. 5 bore hole is in progress. The shaft is 11ft. by 4ft. 6in. in the clear, and divided into three chambers, all close and strongly timbered to the bottom, a depth of 206ft. At a depth of 60ft. from the surface a heavy influx of water was met with in the shaft, and to carry on further sinking without pumping appliances was impossible. A large horizontal engine, 60-H.P., one Lancashire boiler, and a 12in. Cornish pumping plant were procured, and have been substantially erected on concrete foundations. Everything is firm and solid, and every part of the plant, both down the shaft and on the surface, is working smoothly and most satisfactorily. Between the 60ft. and the 180ft. level a lode formation was struck in the shaft, going down nearly vertically. It consists of calcite, containing nice seams and bunches of high-grade yellow ore. The country on each side of the lode was porous and full of joints, admitting water into the shaft freely at the rate of about 15,000galls. per hour; but the pump, working on an 8ft. stroke and six to seven strokes per minute, could easily keep the water down so as to enable sinking to be carried on; but the progress of the work was considerably deterred owing to the great volume of water that had to be contended with continuously in the bottom of the shaft down to the 190ft. level. At the 180ft. level the country rock is fairly hard and solid, and the water has eased off, and is now making about 9,000galls. per hour. A plat has been cut out on each side of the shaft at this level and a cistern fixed, and all the water making above the plat has been caught and carried in pipes into the cistern. The plunger pump has been removed from the 60ft. to the 180ft. plat, and everything has been fixed for pumping water from the cistern and for the draw lift to work from the bottom of the shaft. Both the draw lift and the plunger are working very smoothly, and can pump out the water making at present in the shaft by working four and a half strokes per minute. The lode formation intersected in the shaft at the 171ft. level has continued in the shaft to the present depth, and is still strong in the bottom, going down nearly vertically; and if it continues at the same angle it will probably junction with the large formation intersected at 319ft. in the adjacent bore holes. It appears a promising formation, with 12in. to 24in. of calcite near the eastern walls containing fairly thick seams and bunches of yellow ore. The workings of the Wandilta are now fully 130ft. below the level of the water standing in the Cornwall Mine on the adjoining property, and so far there are no indications that the working of this mine affects the water in the Cornwall in any way; it appears to keep at its original level. It seems to me that the two ore channels disclosed on these properties are separate formations, with a very hard belt of country between the two ore bodies; and it is quite probable that the water pumped out of the Wandilta is discharged at a point over the dividing belt and disappears in the adjoining channel, because there is no indication of any of the water returning to the latter workings. The development, both in the shaft and bore holes, on this property is very encouraging. The ore bodies intersected appear strong and promising, and the mine has been equipped with a complete and most efficient plant to carry on the work. A fine poppet head, 50ft. high, strongly braced, has been erected over the shaft, and a 10-H.P. winding engine has been installed, supplied with steam from one Cornish and one Lancashire boiler of 20-H.P. and 25-H.P. respectively. The boilers and engine are housed in by a wood and iron building 52ft. by 30ft., with changing apartment for miners attached. The pumping machinery has been housed in very neatly and strongly with a wood and iron building 48ft. by 25ft. The other buildings on the mine consist of a blacksmith shop 20ft. by 20ft. carpenter's shop 30ft. by 15ft., pitman's workshop 16ft. by 14ft., storehouse 28ft. by 15ft., two magazines, and a two-roomed office 28ft. by 15ft. Everything on the mine is in first-class order and working satisfactorily, and now that a large portion of the water is kept from getting to the bottom of the shaft, future sinking will be greatly facilitated. (15–4–11.)

Tumby Bay Copper Mine, formerly Wheal Bessie (*vide* Review No. 11).—Situated in the hundred of Hutchison, 4 miles N. from Tumby Bay township. A considerable amount of substantial development work has recently been done on this property. Stephen's underlie shaft, 6ft. by 3ft. 6in. in the clear, has been sunk to a total depth of 100ft. At that level a drive has been extended E. in the lode for a distance of 45ft. The formation disclosed is well defined, bearing E. and W., with a slight underlie S., and from 2ft. to 3ft. wide, consisting of quartz and decomposed slates containing veins and bunches of copper ore, chiefly malachite. At a point 23ft. in this drive a vein of nice ore came in from the hanging-wall and junctions with the main body, and continues E. near the wall of the main channel. The vein is from 4in. to 6in. wide of quartz, carrying grey ore and malachite. The W. drive at the 100ft. level has been extended a total distance of 44ft. from the shaft. The formation disclosed is from 18in. to 36in. wide, carrying copper ore, chiefly carbonates. At the 50ft. level the drive E. from the underlie shaft is in a total distance of 40ft., and a fair amount of stoping has been done over the drive. The lode formation in the workings is from 2ft. to 3ft. wide, showing specks and stains of carbonates through the matrix; 25 tons of the ore extracted from the various workings gave 18 per cent. to 20 per cent. copper. About 90ft. E. from the last workings, Prisk's underlie shaft, 8ft. by 3ft. 6in. in the clear inside of timber, has been sunk to a depth of 64ft. The lode disclosed is from 18in. to 2ft. wide, chiefly quartz impregnated with carbonates. It appears a strong lode, and likely to continue down. Eight samples of the formation taken from the workings were assayed with the following results :—

	Copper.
No. 1. From face of drive, 50ft. level, vein 12in.	3·1 %
No. 2. Bottom E. drive, 100ft. " " 12in.	16 %
No. 3. Centre of E. drive, 100ft. " " 12in.	16 %
No. 4. Back of E. drive, 100ft. " " 12in.	15·9 %
No. 5. W. drive, 100ft. " " 9in.	3·4 %
Prisk's Shaft—	
No. 6. From E. end 64ft. " " 10in.	13·8 %
No. 7. From W. end 64ft. " " 24in.	1·2 %
No. 8. Ore dump	11·1 %

The formation traversing this property appears to be of considerable length. Operations have been carried on along the outcrop by shallow pits for a distance of about 600ft., and at the 100ft. level in the present workings the lode appears very promising and likely to continue down. Judging from what can be seen in the present limited workings and the ore treated, the future prospects of the mine are very encouraging, and fully warrant deeper sinking being carried on to further prove the extent and value of this ore body in the sulphide zone. (2–5–11.)

Pioneer Gold Mine (*vide* Record, page 265, and Review No. 8).—Situated ½ mile W. from Callington. The principal workings are situated on a hill 100ft. above the plain. One of the shafts sunk in the early days of the mine, and from the drives and stopes of which fair quantities of lode material carrying gold were obtained, has now all fallen in, and could not be examined. A short distance N.E. of the old shaft a new shaft, 6ft. by 4ft. in the clear, has been sunk recently to a depth of 42ft., and securely timbered from the surface to the bottom. At the 28ft. level a plat has been made, and a drive carried in N.E. for a distance of 18ft., disclosing a formation from 3ft. to 5ft. wide, consisting of ferruginous quartz, slates, and kaolin carrying gold. Five samples taken from the lode material in the drive gave on assay :—

No. 1. E. side of drive, vein 6in.	4dwts. gold per ton (near plat)
No. 2. Back of drive for a width of 3ft. ..	1dwt. " " "
No. 3. W. side of drive for a width of 2ft.	5dwts. " " "

No. 4. Face of drive 18ft. in from shaft .. 9dwts. gold per ton, 6in. vein
No. 5. W. wall (country) ..... Trace
No. 6. Ore dump ..... 4dwts. gold per ton

The formation exposed in the present limited workings appears fairly defined and likely to continue down, and all the matrix between the two walls carries a little gold ; but the largest portion of the gold occurs in the iron veins traversing the formation. Some of the veins appear very promising, and likely to contain rich shoots of ore in places ; however, that can only be determined when the mine has been opened out and the drives extended in the ore body. The prospects of this mine appear encouraging, and fully warrant systematic development work being carried on to further prove the extent and value of the ore body at a greater depth. (12–5–11.)

Mount Remarkable Copper Mine.—Situated ¾ mile W. from the township of Melrose. The land consists chiefly of hills and deep gullies, with large outcrops of broken strata prominently exposed along the various ridges. The rocks are composed principally of quartzite, shales, and schist, bearing N. and S. These in places appear to have been considerably disturbed and displaced by faults and diorite dykes traversing the property in an E. and W. direction. The quartzite occurs interstratified, also massive, the latter being a distinguishing feature of the outcrops. It contains a fair amount of minerals, chiefly micaceous iron, specks of copper pyrites, and malachite. A considerable amount of prospecting work has been done on the property by shallow pits and open workings at various points on the block where surface indications were favorable for the existence of ore bodies. Operations have been carried down on several leaders to a depth of from 4ft. to 10ft. The ore-bearing material disclosed consists chiefly of ferruginous quartz and calcite veins in decomposed material, containing a little green carbonate, but not in sufficient quantities to pay for working. The main workings are situated on the E. side of a hill, 150ft. above the gully ; copper-bearing material has been operated on here at two points 187ft. apart. An underlie shaft has been sunk on the W. one to a depth of 21ft. The formation disclosed is irregular, with no defined walls, bearing N. and S., dip E., and consists of ferruginous quartz veins and decomposed rock, impregnated with green carbonate. A sample of the lode material taken from the bottom and assayed gave 5·6 per cent. copper, and one sample taken from the N. end of the shaft gave 2·7 per cent. On the E. formation a shaft has been sunk 20ft. vertical and 25ft. on the underlie; the latter portion at the time of my visit was covered over and could not be examined. At the 20ft. level a drive has been extended N. 12ft. on the course of an irregular formation bearing N. and S., dip W. The ore-bearing material disclosed in the drive consists of calcite veins and country rock, impregnated with green carbonate and specks of copper pyrites for a width of from 8in. to 20in. About 5 tons of ore were obtained from these workings, which were dressed into two parcels. One gave 6 per cent. copper and the other 2·7 per cent. A sample taken from a vein 6in. in the face of the drive gave 3·3 per cent., and one from near the shaft, for 12in. wide, gave 1·2 per cent. The ore-bearing material in the two underlie shafts at the present levels is very undefined and of low grade, but there is fairly good indication that at a greater depth the two ore bodies may junction, where probably higher grade ore will be discovered. Nearly midway between the two underlie shafts a vertical shaft 7ft. by 5ft. has been started and sunk to a depth of 73ft. 6in. The sinking of this shaft is now in progress. The intention of the manager is to continue sinking to a depth of 100ft. or more, then crosscut to intersect the formation to prove their width and values in the settled country. Nine samples taken of the veins in the various prospecting pits on the property gave, on assay :—No.1, S. pits, 5ft. deep, 1·2 per cent. copper ; No. 2, from 12in. vein in No. 2 pit, trace of copper ; No. 3, outcrop of quartzite 20ft. wide, 0·2 per cent. ; No. 4, from W.

end of open cut, 0·6 per cent. copper ; No. 5, from large iron outcrop ; No. 6, from pit 10ft. deep ; No. 7, from pit 6ft. in iron formation, trace of copper ; No. 8, from E. side of hill pit, 3ft., 0·7 per cent. copper ; No. 9, from large outcrop N. from workings, 1·2 per cent copper, trace of gold The development in the present shallow workings is not encouraging. All the veins disclosed are small and of low grade, but possibly some of them may improve in width and value at depth. (17–5–11.)

The Talc Mine.—Situated about 8 miles N. from Tumby Bay. The main workings are situated on the E. side of a small hill about 60ft. above the plain, and consist of shafts, drives, and open working, in which are disclosed a large deposit of white kaolin or china clay of good quality. A vertical shaft 4ft. by 4ft. in the clear has been sunk in the talc formation to a depth of 40ft. At the 25ft. level a drive has been carried in from the shaft S.E. for a distance of 10ft. From that point the drive has been extended in a S. direction for a distance of 39ft. The material exposed for the whole distance in the drive and on both sides of it consists chiefly of fine-grained talc. At the 15ft. level and up to near the surface a fair amount of work has been done in the deposit, and considerable quantities of high-grade material appear to have been obtained from these workings, which are from 10ft. to 15ft. wide, and extend in a S. direction for fully 30ft., with good quality talc showing, and no indication of any walls. Judging from what can be seen in the present limited workings and at various points on the surface, the talc deposits appear to be fairly extensive and of high quality. The whole of the material is fine and soft, and could be cheaply extracted. Three samples taken of the material exposed in the shaft and drives were analysed at the School of Mines, and the analysis proves that the deposit is of good quality down to the present depth.

	No. 1. 15ft. Level.	No. 2. 25ft. Level.	No. 3. 40ft. Level.
	%	%	%
Water	1·30	1·06	1·22
Silica	62·02	63·32	61·94
Alumina	1·34	0·92	2·16
Ferrous oxide	0·15	0·15	0·29
Lime	0·48	0·97	Nil
Magnesia	33·99	33·14	33·95
Sodium chloride	0·52	0·30	0·25
	99·80	99·86	99·81

(23–6–11.)